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VOL. II.—9TH YEAR.

SYDNEY: SATURDAY, JULY 29, 1922.

No. 5.

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THE PROGNOSIS OF LOBAR PNEUMONIA AND THE INFLUENCE OF SERUM IN TREATMENT.¹

By S. W. PATTERSON, M.D., D.Sc.,
From the Walter and Eliza Hall Research Institute,
Melbourne.

PART I.

For the purposes of this paper I have collected the records of the cases of lobar pneumonia admitted to the Melbourne Hospital during the last two and a half years. The epidemic and secondary waves of the "pneumonic influenza" of 1918 so altered the character of the acute respiratory infections that I have not pursued my analyses further back than October, 1919, at which time the cases of lobar pneumonia had returned to their pre-influenzal type.

Some reservations must be made before accepting the following figures and deductions as applying to pneumonia generally in southern Australia. They deal with a general hospital population which is probably different from the patients met with in private practice in nutrition and physique and secondly the percentage given for empyema as a complication may be higher than that in private practice, as several patients were admitted for empyema

operation or as "delayed resolution" after having been treated by practitioners outside the hospital in the earlier part of their illness. There were no patients under ten years of age and these figures do not therefore apply to children.

The total number of patients' histories tabulated was 521, with 112 deaths (21.5% total mortality); forty-five (8.6%) empyema occurred as a complication. There were 371 males, of whom seventy-six died and thirty-five had empyema; and 150 females, of whom thirty-six died and ten had empyema. Table I. shows the numbers of males and females and the mortality in decades of age. Chart I. is a graphic representation of Table I..

It will be seen that the prognosis becomes much graver as age advances. The mortality tended to be higher in females as compared with males up to the age of fifty years; after that age the mortality amongst males was higher. The empyema rate kept fairly constant throughout the various ages and was on the whole lower in females than in males.

Incidence.

Chart II. shows the distribution of the cases over the various decades of life compared with the percentage of people living in these decades. The incidence of lobar pneumonia tends to be higher in the younger periods of life. The apparent drop in the decade 10-19 is probably due to the fact that the Children's Hospital takes many patients of these ages.

¹ Read at a meeting of the Victorian Branch of the British Medical Association on June 7, 1922.

TABLE I.—MORTALITY IN RELATION TO AGE AND SEX.

Decade.	Patients.			Mortality.			Empyema.		
	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.
10-19 ..	50	22	72	0.0%	0.0%	0.0%	6	1	7 = 9.7%
20-29 ..	89	37	126	6.75%	13.5%	8.73%	10	1	11 = 8.73%
30-39 ..	98	34	132	11.3%	20.6%	13.65%	3	3	6 = 4.55%
40-49 ..	56	30	86	26.8%	40.0%	31.4%	7	3	10 = 11.6%
50-59 ..	38	16	54	39.4%	37.5%	39.0%	4	1	5 = 9.25%
60-69 ..	35	6	41	65.7%	33.3%	61.0%	5	0	5 = 12.4%
70-79 ..	5	5	10	100.0%	60.0%	80.0%	0	1	1 = 10.0%
Totals.. ..	371	150	521	20.5%	24.0%	21.4%	35	10	45 = 8.6%

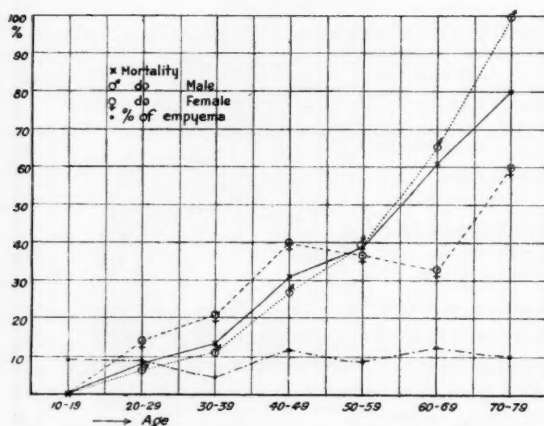


CHART I.

Graph of Table I.: Mortality and Empyema Rate in Relation to Age.

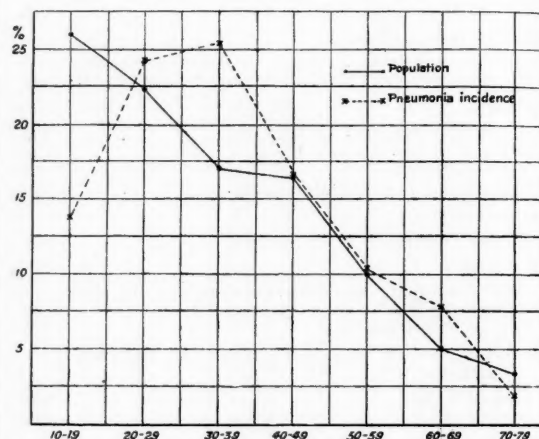


CHART II.

Incidence of Pneumonia in the Different Decades Contrasted with Percentage of Population of Various Ages. Latter curve is from figures of the "Victorian Year Book."

TABLE II.—QUARTERLY MORTALITY.

Season.	Cases.	Deaths.	Mortality.	Empyema.
Spring (September, October, November)	101	25	25.0%	11 = 11.0%
Summer (December, January, February)	115	23	20.0%	9 = 8.0%
Autumn (March, April, May)	138	23	16.7%	8 = 6.0%
Winter (June, July, August)	167	41	24.6%	16 = 10.0%

Table II. shows that pneumonia is more frequent in the autumn and winter months (see Chart III.). The mortality tends to be higher in the winter and spring; the empyema rate is roughly parallel with the mortality.

Invasion.

It will be seen from Table III. that the mortality is about the same whatever the nature of the invasion, whether sudden, sudden with severe chills or rigors or gradual. Also the occurrence of pleurisy with fluid exudate or empyema is about the same in the three categories, but tends to be higher where there was a sudden onset with severe chills.

TABLE III.—NATURE OF INVASION.

Details.	Sudden.	Sudden with Rigors.	Gradual.
Number ..	138	227	127
Deaths ..	25	45	29
Mortality ..	18.1%	19.8%	22.8%
Empyema ..	13	25	11
Percentage .	9.4%	11.0%	8.6%

TABLE IV.—SITE.

Site.	Cases.	Termination.			Mortality.	Empyema.
		Crisis.	Lysis.	Death.		
Left Lower Lobe ..	168	82	59	27	16.1%	18 = 10.7%
Left Upper Lobe ..	11	5	6	0	—	—
Left Whole Lung ..	7	2	0	5	71.5%	1 = 14.3%
Right Lower Lobe ..	203	99	72	32	15.7%	18 = 8.8%
Right Middle Lobe ..	7	4	3	0	—	—
Right Upper Lobe ..	51	28	9	14	27.4%	4 = 7.8%
Right Whole Lung ..	26	4	9	13	50.0%	1 = 3.8%
Both Lower Lobes ..	39	8	12	19	48.6%	—

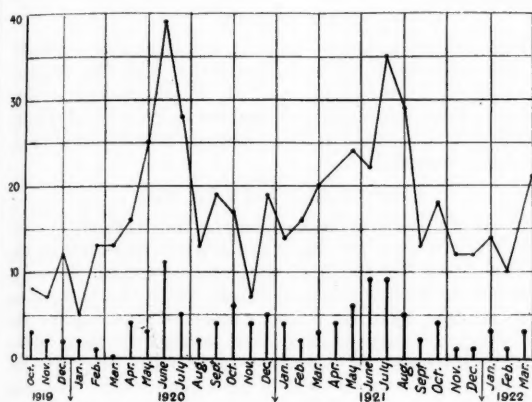


CHART III.

Numbers of Cases of Lobar Pneumonia and Numbers of Deaths from Lobar Pneumonia month by month over the period analysed.

Site of Consolidation.

The right lung was more frequently involved than the left, but the empyema rate was higher on the left side. Table IV. shows also that the mortality was about equal in pneumonia of the left or right base—about 16%; but it was considerably higher when more than one lobe was attacked.

Termination of Fever.

In Table V. the mode of ending of the disease in the different decades of life is shown. Crisis is the most frequent termination in young people, gradually diminishing in frequency in the late decades of life. About one-third of the cases ends by lysis.

Chart IV. is a graph of Table V..

TABLE V.—TERMINATION OF FEVER.

Age.	Crisis.	Lysis.	Death.
10-19	59 = 82.0%	13 = 18.0%	—
20-29	68 = 54.0%	47 = 37.3%	11 = 9.2%
30-39	71 = 53.8%	43 = 32.6%	18 = 13.6%
40-49	29 = 33.7%	30 = 35.0%	27 = 31.4%
50-59	15 = 28.5%	18 = 33.3%	21 = 39.0%
60-69	3 = 7.3%	13 = 31.7%	25 = 61.0%
70-79	1 = 10.0%	1 = 10.0%	8 = 80.0%

From Chart V. it will be seen that the crisis occurs most frequently from the sixth to eighth

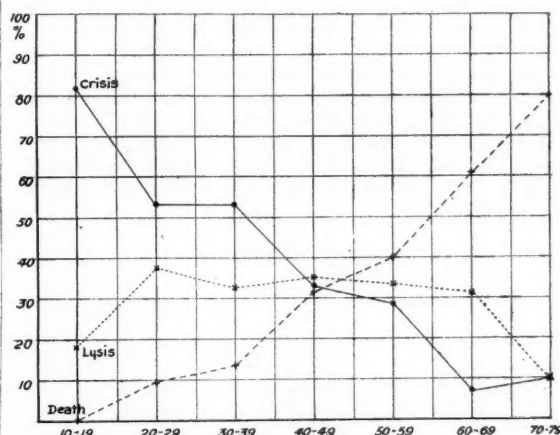


CHART IV.

Graph of Figures of Table V..

day and that death is most usual on the sixth to tenth days. In fourteen cases (12.5%) death was preceded by a pseudo-crisis; in the remainder the temperature continued high till the time of death. In thirty-two instances the crisis was followed by a rise of temperature, usually lasting not more

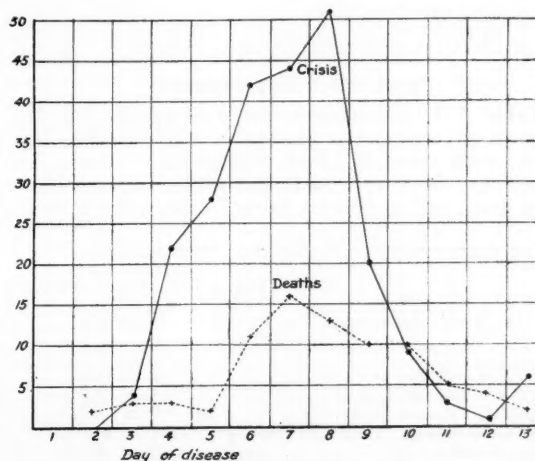


CHART V.

Graph of Numbers Ending by Crisis or Death on Various Days of the Disease.

than twenty-four to forty-eight hours, but sometimes up to five days, unless due to pleurisy, and then it was usually accompanied by fluid effusion or empyema.

Occupation.

Table VI. gives the results of classifying the patients' occupations in groups. Home duties includes domestic workers (and therefore the majority of the female patients), school children and old-age pensioners. A large number consisted of labourers, nature of work unspecified. Factory and indoor workers were factory-hands, dress-makers, clerks, waiters, carpenters, etc.. Outdoor workers were gardeners, farm hands, drivers, jockeys, etc.. Those considered as specially exposed to extremes of heat and cold were cooks, laundresses, blacksmiths and engine firemen. This last group shows a higher mortality than the others, but as the total number is small and other factors may have contributed to raise the mortality, I do not think that too much stress should be placed upon it. On the whole, occupation does not affect the mortality.

TABLE VI.—OCCUPATION.

Occupational Group.	Number.	Deaths.	Mortality.
Nil	38 = 7.3%	7	18.5%
Home (see text) .. .	147 = 28.2%	32	21.8%
Labourer	104 = 20.0%	21	20.2%
Factory and Indoor .. .	111 = 21.3%	19	17.1%
Outdoor	91 = 17.5%	22	24.2%
Exposed to Heat and Cold	30 = 5.75%	11	36.8%

Previous History.

Sixty-six patients (12.65%) had had pneumonia before, some several times, one five, one six and one ten times.

Mortality of patients with history of previous—

Pneumonia	15.3%
Pleurisy	33.0%
Asthma and Bronchitis	66.0%
Typhoid Fever	27.8%
Syphilis (or positive Wassermann reaction) .. .	21.4%

Type of Infecting Organism.

Table VII. summarizes our observations on the type of pneumococcus present in one hundred and forty-seven cases of lobar pneumonia. It will be noted that the mortality in this table is higher than that given in the general table (Table I.). This is

TABLE VII.—TYPE OF PNEUMOCOCCUS (MULFORD SERUM).

Infecting Organism.	Total.	Deaths.	Mortality.	Empyema.
Type I. Pneumococcus	63 = 43%	21	33.3%	7 = 11.1%
Type II. Pneumococcus	14 = 9.5%	2	14.3%	—
Type III. Pneumococcus	7 = 4.75%	1	14.3%	—
Non-agglutinating Pneumococcus.	51 = 34.7%	19	37.2%	7 = 13.7%
Streptococcus	12 = 8.1%	6	50.0%	2 = 16.6%
Total	147 = 100%	49	33.3%	16 = 10.9%

partly due to a large number of our cultures being made from material obtained *post mortem*. Since in this way the nature of the disease was verified at autopsy and the cultures were made from lung substance uncontaminated by sputum or bronchial secretion, the relative incidence of the various types of pneumococci in lobar pneumonia in Melbourne is the more likely to be accurate. It will be seen that pneumococci belonging to Type I. of the American classification occur in over 40% of the cases. This is of great importance, when it is recognized that the only procurable monovalent anti-pneumococcal serum is that prepared with Type I. pneumococci.

Leucocytosis.

The leucocyte count is only occasionally entered in the case-sheets of these patients, but the reader is referred to the results of H. F. Maudsley of detailed observations of the leucocyte counts of some of the patients of the present series, already reported in this journal.⁽¹⁾

Blood Pressure and Pulse Rate.

It is unnecessary to emphasize the importance of the condition of the myocardium in pneumonia or to lay stress on the fact that the prognosis largely depends on how the heart stands up to the toxæmia. The average systolic blood pressure was higher in the later decades of life, but there was no appreciable difference in the fatal cases from that of the patients of the same decade who recovered. On the whole, the blood pressure tends to fall during the course of the illness, but sometimes it rose and no general statement can be made to be used as a measure in prognosis.

Complications.

Pleurisy with Effusion and Empyema.

The percentage of cases with these complications is almost constant for all ages (see Table I.). The mortality in cases of pneumonia complicated with empyema is of the same order as the general mortality for the same age (compare Table VIII. and Table I., mortality, total, graphically shown in Chart VI.).

TABLE VIII.—EMPYEMA.

Decade.	10-19.	20-29.	30-39.	40-49.	50-59.	60-69.	70-79.
Cases ..	13	20	16	11	6	6	2
Deaths ..	0	2	4	3	5	4	1
Mortality	0	10	25	27	83	66	50



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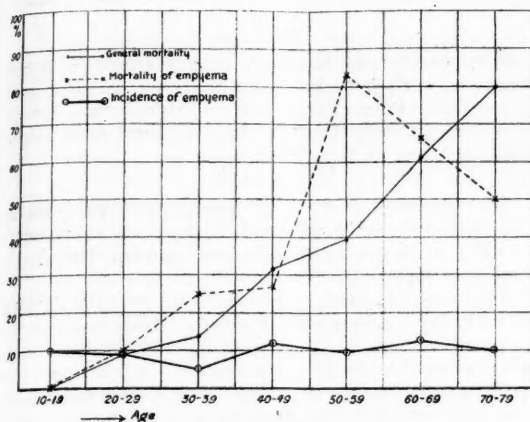


CHART VI.

Graph Combining the Empyema Figures of Tables I. and VIII. Empyema is of almost constant frequency throughout life and the mortality in cases complicated with empyema is practically parallel with the general mortality.

Albuminuria.

This is an important factor in prognosis. When the cases are classified according to the content of albumin in the urine, it is seen (see Table IX.) that the outlook becomes considerably graver when much albuminuria is present.

TABLE IX.—ALBUMINURIA.

Amount of Albumin.	Total.	Deaths.	Mortality.
Nil	170	23	13.5%
Trace	91	15	16.5%
+	128	36	28.0%
++	14	6	43.0%

Jaundice.

Jaundice was present in nine patients, of whom four died (mortality, 45%). The incidence of jaundice did not seem to be related in any way to the site of the pneumonic consolidation.

Pregnancy.

Eight patients were pregnant, of whom four aborted and two died (mortality, 25%; higher than that of non-pregnant women of the same age).

Treatment.

Table X., giving the mortality of pneumonia in relation to the day of illness on admission to hospital, indicates that on the whole the earlier hospital treatment is adopted, the less the percentage of deaths. But the figures are not conclusive and may be read as showing that it is more serious to move a patient in the sixth to eighth day of his disease, as presumably the majority of the patients had been under medical treatment outside the hospital.

TABLE X.—HOSPITAL TREATMENT.

Days Ill Before Admission to Hospital.	Total.	Deaths.	Mortality.	Empyema.
One	46	10	21.7%	6.5%
Two	88	9	10.2%	8.0%
Three	85	16	18.8%	4.7%
Four	95	13	13.7%	9.5%
Five	64	12	18.7%	4.7%
Six	39	10	25.6%	2.5%
Seven	48	18	37.5%	6.25%
Eight	8	3	37.5%	12.5%

PART II.

Serum Treatment.

When we compare the results in pneumonia during the last hundred years, we find the mortality with expectant treatment is much the same as with the drastic bleeding and tartar emetic treatment of the beginning of last century (see Table XI.). The figures published by Dochez in New York and Lister in South Africa do seem to show, however, that serum treatment is likely to bring about a great improvement in the results. As the infection is with a definite organism, specific treatment must be directed to combating that organism. Dochez's figures in Table XI. were obtained with the use of Type I. pneumococcal serum in lobar pneumonia due to Type I. pneumococcus. The serum should be given early in the disease. Other desiderata in the use of serum are that, as the serum on the market is unconcentrated, large doses should be administered by the intravenous route, since rapid absorption is advisable.

TABLE XI.—MORTALITY IN PNEUMONIA.

Date.	Observer.	Treatment.	Cases.	Deaths.	Mortality.
1808-1810	Rasori	Bleeding and tartar emetic	832	173	20.8%
1883	Collective investigation, British Medical Association	Largely expectant	1,060	191	18.0%
1891-1896	Guy's Hospital	Expectant	434	111	25.6%
1919-1922	Melbourne Hospital	Expectant	455	97	21.3%
1921-1922	Melbourne Hospital	Serum (see text)	66	14	21.2%
1917	Dochez (New York)	Serum	65	5	7.7%
1918	Lister reduced mortality of pneumonia among Rand miners from 49% to 20% by serum treatment				

Hypersensitiveness to Serum or Previous Sensitization.

Patients may be hypersensitive to horse serum, either naturally or as the result of previous treatment with horse serum and should be tested before a large dose of serum is given. The testing may be carried out by administering 0.06 cubic centimetre (one minim) either of serum undiluted or of serum diluted four times with saline solution intradermally; it is a less delicate test if given subcutaneously. If there is no reaction, the slight pallor caused by the injection disappears almost at once; sensitiveness is shown by a wheal with surrounding area of redness. If no reaction occurs, the dose of serum may be administered at once, but the first few cubic centimetres should be given slowly and the effect watched. It is very rare to find any reaction at this stage when there is no response to the skin tests. If a wheal forms in response to the first intradermal or subcutaneous injection, it should be repeated hourly until there is no reaction. The patient is in this way usually desensitized and the administration may be proceeded with, but careful watch should be kept for any symptoms of distress, when the injection should be intermitted and time allowed for the distress, which is usually only momentary, to subside. I am indebted to Miss B. Warner, M.B., late resident physician at the Melbourne Hospital, for an analysis of twelve cases of lobar pneumonia treated with serum in Dr. Stowell's wards. Four of nine patients tested showed some sensitiveness to serum; one only proved refractory to desensitization and serum treatment was withheld in this instance. This patient had had anti-tetanus serum during the war; he reacted strongly to the skin tests and a few days later he had a severe attack of urticaria after the administration of about 0.72 cubic centimetre (twelve minims) of serum only.

Serum Sickness.

Four of the twelve patients had urticaria and one joint pains subsequent to the dosage with serum; in no instance were these symptoms severe; they were less frequent in those patients who were given one gramme of calcium lactate thrice daily from the time of the first injection of serum.

Results.¹

Sixty-six patients in the Melbourne Hospital series were treated with anti-pneumococcal serum, either polyvalent or monovalent. As a rule, serum was given only to patients who were severely ill or who were doing badly and for that reason was often given late in the disease. Thus three patients received serum only on the day before their death, which occurred on the tenth, eleven and eighteenth day respectively. Twelve other patients, of whom three died, may legitimately be excluded because serum was given in small doses and especially small single doses of five to ten cubic centimetres subcutaneously.

This leaves fifty-one patients treated with polyvalent or monovalent (Type I.) serum administered subcutaneously or intravenously or both ways with eight deaths, *i.e.*, a mortality of 15.7%.

¹ Several charts were presented illustrating the fallacies in trying to assess the value of serum treatment from individual cases.

Methods.

The serum may be given with a funnel and cannula or, with less disturbance to the patient, with a record syringe fitted with a hypodermic needle, which is pushed through the sterilized skin into a vein in front of the elbow.

Summary.

The mortality of lobar pneumonia patients at the Melbourne Hospital is 21.3%; in 51 patients treated with anti-pneumococcal serum the death-rate was 15.7%.

These figures are in themselves sufficiently striking to warrant a wider use of serum. They confirm the impressions received by Sewell⁽²⁾ from the treatment of twelve cases of pneumonia with serum. For an adequate test of the value of the treatment, however, it would be necessary either to treat with serum every patient admitted with pneumonia to hospital over a period of some months and to compare the results statistically with those of Part I. of this paper; or, better, to treat the first of every three patients admitted consecutively with anti-pneumococcal serum, the second with normal horse serum and the third expectantly and to compare the results. In both cases it would be essential to control the nature of the infecting organism by utilizing the full resources of a modern laboratory technique.

I am indebted to Miss F. E. Williams for her great assistance in the isolation and typing of the organisms reported in Table VII.

References.

- ⁽¹⁾ Maudsley, H. F.: THE MEDICAL JOURNAL OF AUSTRALIA, June 11, 1921, page 484.
- ⁽²⁾ Sewell, S. V.: *Australian Medical Journal*, New Series, Volume III., 1914, page 1,547.

THE ACTION OF THE PNEUMOCOCCUS ON AROMATIC AMINO-BODIES.¹

A DIFFERENTIAL MEDIUM.

BY W. J. PENFOLD, M.B., B.HY.,

Director of the Commonwealth Serum Laboratories,
Royal Park, Victoria.

PART I.

THIS work resulted from an attempt to discover selective capacity in aniline and related bodies.

It is well known that aniline workers are particularly liable to cancer of the bladder. Whether aniline is the substance that produces this tumour or not is not at present known. Aniline is excreted in the urine in various forms, but no evidence is forthcoming as to the particular form, if any, which produces the tumour in the bladder wall.

Lumps are produced in bacterial colonies by various substances, notably by carbo-hydrates^{(1) (2) (3)} and by certain poisons.⁽⁴⁾ This has been shown to be due to the selective power of these substances. It appeared, therefore, possible that the selective power of aniline and of related bodies could be investigated by adding them to plates in which surface cultures of bacteria were about to be made.

¹ Read at a meeting of the Victorian Branch of the British Medical Association on June 7, 1922.

It was hoped, if lumps (so-called secondary colonies) appeared under the influence of any of these selecting agents, that these secondary colonies might be used as an indicator to demonstrate the capacity of other substances to neutralize this selective power. In the very early stages of the work the appearance of pneumococcal colonies on aniline blood-agar plates was investigated, when a striking pigment reaction was found to characterize the growth of this organism on this particular medium. This reaction formed a very interesting side-line in the work, for the Australian pneumococci had been the subject of intensive investigation during the previous year in this Institute.

The medium on which the pneumococcus was grown, was made up as follows:

Eighteen cubic centimetres of nutrient agar, having a reaction of pH 7.3, was added to a plate containing two cubic centimetres of citrated horse blood and two cubic centimetres of 2% aniline in normal saline solution. (standard aniline solution). The Petri dishes used were of 12.5 centimetres diameter. The citrated horse blood consisted of nine parts of horse blood and one part of 16% sodium citrate solution.

In the preparation of the plate the stated amount of blood was first added to the plate, then the aniline solution was run into the blood and then agar at a temperature of 44° C. was added; the whole was well mixed. The incubation of cultures was always conducted at 37° C..

Nature of the Pigment Reaction.

If the blood-agar plate, containing the before mentioned amount of aniline and having colonies of the pneumococcus upon it, be held up to the light so that it is viewed by transmitted light, the colonies appear dark, almost black; with smaller concentrations of aniline they may appear brown or colourless by the same method of examination, depending upon the quantity of aniline present.

If, on the other hand, the plate be viewed by reflected light, a deep steely blue is found to surround the colonies. In this paper this pigment reaction will be frequently referred to as "blackening," because of the striking appearance produced about the colonies when they are viewed by transmitted light.

A large number of pneumococci were tested upon this medium, forty of these strains having been recently isolated. The strains were of various types; Types I, II, and III, and several varieties of Type IV. (American classification) were all represented and were all found to give the characteristic pigmentation. A few pneumococci which had been in laboratory culture for about two and a half years, did not give the pigmentation to anything like the same extent as the others.

Ten streptococci were investigated. Of these ten streptococci all gave well-marked pigmentation, though in one case the pigmentation was a little late in appearing.

Time of Appearance of Colour Reaction.

As a rule colonies of the pneumococcus or streptococcus, grown at 37° C. on aniline blood-agar plates, show a well-marked colour reaction in eighteen to twenty-four hours; in the case of the streptococcus

the reaction may very occasionally not appear until after forty-eight hours.

The Effect of Other Organisms on this Medium.

The following organisms were grown on the medium and all failed to give the pigment reaction, that is to say: Three strains of *Bacillus influenzae*; two strains of *Bacillus suispestifer*; one strain each of *Bacillus dysenteriae* (Shiga), *Bacillus dysenteriae* (Flexner), *Bacillus dysenteriae* (Y), *Bacillus typhosus*, *Bacilli paratyphosus A et B*, *Bacillus enteritidis* (Gaertner), *Bacillus coli*, *Vibrio cholerae*, *Bacillus diphtheriae*, *Staphylococcus albus*, *Gonococcus*, *Meningococcus*.

Experiments with Pneumococcal Cultures.

One and a half, two and two and a half cubic centimetre quantities of the standard aniline solution were tried in plates with a series of six pneumococcal cultures; each plate contained, in addition, twenty cubic centimetres of citrated blood-agar. After forty-eight hours it was found that some of the strains of pneumococcus had not grown on the plates having 2.5 cubic centimetres of aniline solution. The remainder showed colonies with blackening, but also with marked inhibition of growth, as indicated by the size of the colonies. Some of the strains were found so susceptible that on plates containing only two cubic centimetres of the aniline solution no growth occurred in forty-eight hours.

On plates having 1.5 cubic centimetre quantities of the aniline solution blackening invariably occurred; in some cases inhibition of the growth of the colony was marked as against the growth of normal control colonies on ordinary blood-agar plates without aniline. A series of twenty pneumococcal cultures was then tried with lower quantities of aniline in the plates.

Three plates were put up with each strain, one plate having no aniline to serve as a control, the other two plates having 0.5 and one cubic centimetre of standard aniline solution respectively. All the strains examined showed blackening of the colonies in both the aniline plates. The aniline acted as a slight inhibitor, so that the colonies were a little smaller as a rule than the colonies of the control plates which contained no aniline. Eight strains in the 0.5 cubic centimetre aniline plates showed no definite inhibition; twelve showed slight inhibition. In the case of the one cubic centimetre plates only two showed no inhibition after forty-eight hours' growth, while eighteen were very definitely inhibited.

In the early experiments inhibition in growth appeared to be most marked with the Type III. strains, but as our examination of each type extended, we found susceptibility to aniline would not differentiate Type III. pneumococci from the other pneumococci.

A new series of plates, containing no aniline, 0.01, 0.05, 0.1, 0.2 and 0.5 cubic centimetre of standard aniline solution respectively, was inoculated with the pneumococcus in order to ascertain the lowest concentration of aniline which was necessary to give the pigmentation; each of these plates contained twenty cubic centimetres of blood-agar.

The 0.5 cubic centimetre plate showed a good growth of black colonies, while the 0.2 cubic centi-

metre plate showed colonies which were brown on being viewed by transmitted light. The plates with 0.1, 0.05 and 0.01 cubic centimetre respectively showed no pigmentation after forty-eight hours' growth.

These results suggest, therefore, that the best concentration to use is 0.5 cubic centimetre of the standard aniline solution in a plate containing twenty cubic centimetres of citrated horse blood-agar. This quantity of aniline is sufficient to give good blackening and is insufficient to give marked inhibition.

Aniline Agar Without Blood.

One strain of pneumococcus which blackened well on the described medium, was grown on an aniline agar plate which contained twenty cubic centimetres of nutrient agar plus 0.5 cubic centimetre of standard aniline solution. This plate showed a fair growth of small colonies, but, although it was carefully watched for seven days, no trace of blackening appeared.

A further experiment was done in which four plates were made up, each containing eighteen cubic centimetres of agar and two cubic centimetres of normal horse serum. Three of these plates had standard aniline solution added to them in quantities of 0.1, 0.2 and 0.5 cubic centimetre respectively. They were all inoculated with the pneumococcus and examined after incubation, but no blackening occurred around the colonies on any of these plates.

Stability of the Aniline Medium.

This investigation suggested that the aniline medium might be of very considerable value in the isolation of the pneumococcus and the streptococcus in ordinary clinical bacteriology. An effort was made to make an aniline nutrient agar, so that the addition of aniline to the individual plates would be unnecessary. This medium was prepared as follows: To every twenty cubic centimetres of nutrient agar 0.5 cubic centimetre of a 2% solution of pure aniline in normal saline solution was added. This mixture was tubed in twenty cubic centimetre quantities and autoclaved for twenty minutes at 120° C. Plates were prepared by melting the aniline agar, cooling it to 46° C., pouring it into plates containing two cubic centimetres of citrated blood and mixing. The pneumococci inoculated on the medium caused well marked blackening of the colonies by transmitted light.

This medium was similarly used for the streptococcus; here, again, the pigment reaction was clearly revealed, though it was not quite so dark as in the control streptococcal plates to which aniline had been added to the plates, apart from the nutrient agar. This shows, therefore, that stable nutrient aniline-agar can be made in the medium department and used directly for routine work.

Ten different strains of streptococci, when grown on this aniline blood-agar, gave blackening, but a certain variability as between individual colonies was noted to an extent that was not observed in the case of the pneumococci examined. These ten streptococci had been isolated from cases of puerperal fever, scarlet fever, septicæmia, post-influenzal pneumonia and influenzal sore throat.

One strain, obtained by blood culture from a case of septicæmia, when plated out on the medium, showed after twenty-four hours' growth black and white colonies. One of each of these types of colony was inoculated into broth and plated again on the aniline blood-agar, with the result that the black colony broth gave colonies on the next plate which were nearly all black after twenty-four hours, but the white colony broth gave colonies on the second plate which at the same time were all black. The two forms seemed to be similar and the time at which the blackness developed in the colony was irregular.

Of this phase of variability in respect of the pigment reaction we will treat further in Part II. of this paper.

Another streptococcus which had vigorous hæmolytic power, gave on the plates of aniline blood-agar two types of colony after forty-eight hours' growth, namely, large black colonies which were non-hæmolytic and small colonies which were black and hæmolytic.

These types were inoculated into broth and replated on aniline blood-agar, when they were found to retain their original characters, that is to say, the large, black colony passed through broth gave the same large, black, non-hæmolytic colonies on the second blood-agar aniline plate, while the small, black, hæmolytic colony, after passing through broth, gave plates showing only small, black colonies of hæmolytic character.

The variability of the streptococcus dealt with in Part II. of this paper supports the idea that the strains with which we were working were quite pure.

The pigment reaction in the case of the streptococcus also was not obtained on aniline plates unless blood was contained in the plates. Serum would not take the place of blood in this reaction. The concentration of aniline necessary to give the best reaction was similar in the case of the streptococcus to that found with the pneumococcus.

Susceptibility of Various Bacteria to Aniline.

Bacillus dysenteriae (Flexner), *Bacillus coli*, *Staphylococcus albus* and *Bacillus typhosus* were all found to grow at higher concentrations of aniline than the maximum concentrations permitting of the growth of the pneumococcus or streptococcus.

Some preliminary work was done on sputum from patients with phthisis and pneumonia, when it was found that it was comparatively easy to isolate the pneumococci and streptococci by the help of this reaction.

From the plates made from the pneumonic sputum single colonies were picked off, which turned out to be pneumococcal in each instance.

From portions of pneumonic lungs obtained *post mortem* luxuriant growths of black colonies of pneumococci were obtained, so that the pneumococcus, as it comes directly from the body, appears to give in a marked degree this aniline reaction.

Conclusions.

(1) All recently isolated pneumococci give a characteristic pigment reaction when grown on aniline blood-agar.

(2) Of ten streptococci tested all gave a similar colour reaction, though in the case of one non-hæmolytic streptococcus the reaction was delayed.

(3) In the case of one streptococcal strain which had been grown on the medium for twenty-four hours some of the colonies were white and some black. In the case of another strain some of the colonies were large and non-hæmolytic and some small and hæmolytic; these differences did not appear to depend upon impurity of the strains.

(4) The best concentration of aniline for the obtaining of this reaction was obtained with 0.5 cubic centimetre of 2% aniline added to eighteen cubic centimetres of agar and two cubic centimetres of citrated horse blood.

PART II.

The results obtained with aniline blood-agar made it desirable to investigate the action of the pneumococcus on substances chemically related to aniline. For this purpose solutions of the following substances were put up in the strengths indicated:

1. Benzidine, 0.25 gramme; water, 50 cubic centimetres, hydrochloric acid (British Pharmacopœia) 0.35 cubic centimetre. (This solution was clear, but very slightly brown and a light brown precipitate formed on standing.)

2. Para-phenylene-diamine, 0.25 gramme; water, 50 cubic centimetres. (This solution became rapidly dark brown and threw out a dark precipitate.)

3. Beta-naphthylamine, 0.25 gramme; water, 50 cubic centimetres; hydrochloric acid (British Pharmacopœia), 0.25 cubic centimetre. (A clear, slightly pink solution.)

4. Penta-methylene-diamine hydrochloride, 0.25 gramme; water, 50 cubic centimetres. (A clear, colourless solution.)

5. Tyrosin, 0.015 gramme; distilled water, 50 cubic centimetres. (A clear, colourless solution.)

All these solutions were passed through efficient bacterial filters.

Strain "Stiffin," an Australian Type I. pneumococcus, was the test organism used in the early experiments. The organisms were invariably grown at 37° C.

In the first experiment blood-agar plates were made containing the organic compound; eighteen cubic centimetres of nutrient agar, two cubic centimetres of citrated horse blood (of similar composition to that indicated in the first section of this communication) and two cubic centimetres of the solution of the organic compound to be tested were contained in each of the plates.

The following results were obtained:

Benzidine.

The plates containing benzidine showed after twenty-four hours' incubation at 37° C. colonies which appeared very black by transmitted light and a metallic blue by reflected light. This dark discoloration extended far into the medium around the colony.

The benzidine reacting with the blood caused a slight darkening of the medium generally, but not

sufficient to interfere with the striking colour reaction produced by the colonies.

Para-Phenylene-Diamine.

On the para-phenylene-diamine plates growth was completely inhibited; the medium was of a very dark brown colour.

Beta-Naphthylamine.

A slight growth only appeared on the β -naphthylamine plates, the concentration of the substance evidently being too strong for the purpose required. No darkening was seen in the neighbourhood of a few small colonies that appeared.

Penta-Methylene-Diamine and Tyrosin.

The penta-methylene-diamine and tyrosin plates did not show any characteristic colour reaction; no ferrous sulphate was added to the tyrosin plates.

From these and the previous experiments it was evident that the pneumococcus acted upon benzidine and aniline in an analogous manner.

A new experiment was carried out in a series of plates having the same quantity of agar and citrated blood as before mentioned, but with descending quantities of para-phenylene-diamine solution; that is to say, one cubic centimetre, 0.5 cubic centimetre, 0.2 cubic centimetre, 0.1 cubic centimetre and no para-phenylene-diamine respectively. All these plates were inoculated with the same strain of pneumococcus. Slight discolouration of the medium occurred in all the plates containing para-phenylene-diamine. A marked inhibition of growth was present in the plates containing 0.5 cubic centimetre and one cubic centimetre of the solution, but not in the plates containing lower quantities. No blue coloration around the colonies was observed.

The streptococcus was found to act upon benzidine as the pneumococcus did, but in an irregular manner in that all the colonies did not show the coloration in the case of all its strains.

Plate experiments were then undertaken to determine whether any other organisms than the pneumococcus and the streptococcus produced dark colonies on benzidine blood-agar. Twenty cubic centimetres of citrated blood-agar were added to each plate and also one cubic centimetre of a 0.5% benzidine solution. This concentration of benzidine had been found by control observation sufficient to give the "blackening" in the case of the streptococcus and pneumococcus and not sufficient to inhibit greatly.

The plates were inoculated with *Bacillus dysenteriae* (Shiga, Flexner and Y—thirteen strains), *Bacillus typhosus*, *Bacillus paratyphosus A*, *Bacillus paratyphosus B*, *Bacillus enteritidis* (Gaertner), *Vibrio cholerae*, *Bacillus pyocyaneus*, *Proteus X 19*, *Bacillus coli* (twelve strains), *Bacillus suispestifer*, *Bacillus diphtheriae*, *Staphylococcus aureus* (thirty-five strains), *Staphylococcus albus* (thirty-two strains), *Gonococcus*, *Bacillus pertussis* (Bordet), *Meningococcus* (eight strains). In all cases single strains only of the organism were used, except where indicated otherwise in parentheses.

These plates were observed from December 30, 1921, to January 2, 1922, but the characteristic colour change was not observed.

Control plates inoculated with the pneumococcus and streptococcus (strain "Jones"), showed marked

colour changes. In the case of the pneumococcus all the colonies showed the colour change and the colour was diffused into the surrounding medium over an area having in some cases three times the diameter of the colony.

After three days' incubation the streptococcal plate of the strain "Jones" showed only 80% of the colonies with the typical blue coloration; other colonies showed marked hæmolytic action with no trace of the colour change, others again showed hæmolysis and slight colour reaction. The very

dark colonies had a hard nucleus, possibly due to the accumulated pigment; the white colonies were soft to the touch of the platinum wire.

A series of pneumococci, representative of Australian types one to twelve (omitting type eleven), was then plated out on this benzidine-blood-agar medium. All the strains gave a typical colour reaction after growth in the incubator overnight.

A short series of streptococci was then plated out on benzidine-blood-agar and gave the results shown in Table I..

TABLE I..

Medium: Benzidine blood agar (one cubic centimetre of 0.5% benzidine solution to twenty cubic centimetres of citrated blood-agar). Plates made: January 4, 1922.

Strains.	Source of Strain.	Plates Examined.		
		January 5, 1922.	January 6, 1922.	January 7, 1922.
"Davis"	Blood culture in puerperal septicæmia	Large slate grey colonies, all producing the pigment around them; coloration marked at site of inoculation, where colonies are smaller and more numerous	—————	—————
"Irwin"	Lung, <i>post mortem</i> ; post-influenzal pneumonia	A few colonies, varying from medium to large, not producing blue pigment	Colonies very dark brown by transmitted light	Colonies black by transmitted light, showing ring formation, nucleus usually raised, with papillæ
"Jones"	Blood culture in puerperal septicæmia	Blackening commencing at site of inoculation, where colonies are small and numerous; about 40% producing characteristic pigment	All colonies producing pigment; colonies almost black by transmitted light	—————
"White"	Melbourne Hospital; case unknown	About 10% not producing the blue pigment; colonies slate grey	All producing dark pigment; colonies yellowish colour centrally	—————
"Walker"	Blood culture in septicæmia	Good blackening round all colonies; large, brownish white colonies; raised brown nuclei and pronounced ring formation	—————	Dark brown colonies showing large papillæ and sunken centres
"Conder"	Melbourne Hospital (?)	About 50% showed blackening; hæmolytic more distinct around white colonies than around black ones	Flat, brownish white colonies, all producing blackening around them	Large flat colonies, showing brown centres
"3"	Scarlatinal throat	A few colonies not producing blue pigment zone; brown colonies showing raised nucleus usually	Large dark brown colonies showing ring formation with sunken nucleus on some large colonies; all producing characteristic blue pigment	As preceding column
"103"	Influenza epidemic	Almost all colonies pinkish white; about six colonies show blackening around them	Very little change; about ten colonies only show blackening	As preceding column

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The results obtained with these eight streptococci showed that all of them were able to give rise to characteristically pigmented colonies after forty-eight hours' incubation.

Seven of the eight strains showed the typical colour change in all the colonies, while only a small proportion of the colonies of strain "103" showed it.

The streptococcal strain "Jones," which had on a previous occasion shown only 80% of dark colonies after forty-eight hours' growth on the benzidine-blood-agar medium, was examined further. A résumé of this examination is shown on Chart I.

From the benzidine-blood-agar plate, which had been incubated for four days, white and black colonies were picked off and inoculated into broth tubes.

White Colony Broth.

(A) After twenty-four hours a good growth was evident in the white colony broth; it was then re-plated on benzidine-blood-agar plates. After eighteen hours' incubation, white colonies only were present on the plate. After twenty-four hours a few of the colonies were black, although the pigment change was not very extensive around the colonies. The proportion of white to black colonies is indicated on the chart. After forty-eight hours almost all the colonies were black. A few colonies, however, did not show the pigment change, but showed marked hæmolytic.

(B) The control black colony, which had been picked off the original benzidine-blood-agar plate and passed through broth, gave after twenty-four hours' incubation a relatively poor growth in it. It was then re-plated on benzidine-blood-agar.

After the "black colony" benzidine-blood-agar plate had been incubated for eighteen hours, almost all the colonies were black. After twenty-four hours all the colonies were black, so that the difference between these two strains in respect of pigment production was that the white colony gave rise to a progeny which consisted chiefly of black colonies only after forty-eight hours' growth on the medium, whereas the black colony gave rise to a progeny which was entirely black after twenty-four hours' growth on the medium. The difference between the two strains was distinctly revealed in the benzidine plates after eighteen hours' incubation.

The benzidine-blood-agar plate, which had been

inoculated from the "white colony" broth and which after forty-eight hours' growth still showed a mixture of black and white colonies, had taken from it white and black colonies again, as indicated on the chart. These were passed through broth and again inoculated on to benzidine-blood-agar plates. In the case of the plate inoculated with the "white colony" broth the results were: After eighteen hours a large number of pin-point colonies appeared, all of which were white. After twenty-four hours a small group of the colonies was dark. After forty-eight hours there were two batches of dark colonies present, while marked hæmolytic occurred round the white colonies.

Black Colony Broth.

In the case of the plate inoculated with "black colony" broth: After eighteen hours' incubation all the colonies were white. After twenty-four hours' incubation several batches of dark colonies were present. After forty-eight hours, 50% of the colonies were a dark blue-black; marked hæmolytic was present around the white colonies.

A few colonies with the blackness confined to the centre of the colony showed hæmolytic around them. A few showed no hæmolytic and no diffused blackening, though the colony itself appeared black by transmitted light.

The original black colony, which was taken from the benzidine-blood-agar plate of strain "Jones" and which had

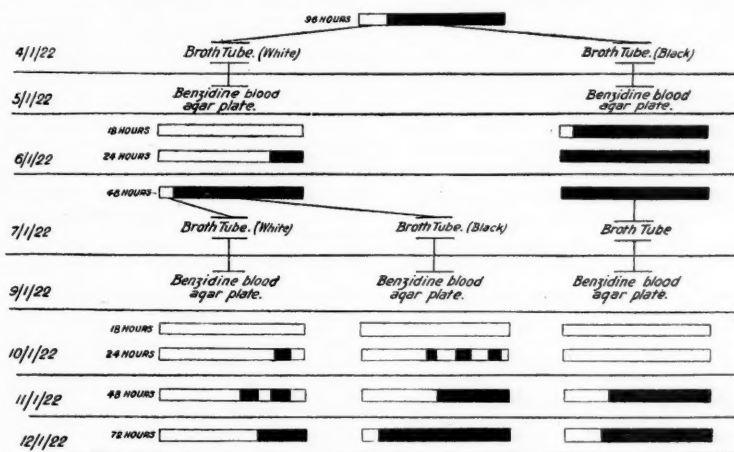


CHART I.

The elongated oblong areas indicate the plates and the white and black areas the proportion of white to black colonies present at the given time. The lines issuing from the plates show the type of colony which was taken for sub-culture. The numbers indicate the hours of incubation at 37° C. between the seeding and observation of the plates. Where the black colonies occurred in patches the black area is broken.

been plated out on a second benzidine-blood-agar plate, gave after twenty-four hours' incubation good pigment production in all the colonies. One of these colonies was passed through broth again and re-plated for the third time on benzidine-blood-agar. After eighteen hours' growth all the colonies were of pin-point size and white in colour and they remained white after twenty-four hours' growth. After forty-eight hours' growth 70% showed slight hæmolytic and blackening. After seventy-two hours all the large colonies showed blackening and slight hæmolytic and crowded patches of white colonies showed marked hæmolytic.

The accompanying genealogical table graphically represents the most important of these results and suggests that the power to form pigment is an erratic function of this particular strain. It has not been possible hitherto to develop permanent "black" and "white" strains of the organism.

An experiment was undertaken to determine the

optimum concentration of benzidine for use in blood-agar plates which were to be inoculated with pneumococci or streptococci. For this purpose a series of plates, all containing twenty cubic centimetres of citrated blood-agar and containing respectively one, 0.5, 0.25 and 0.125 cubic centimetre of 0.5% benzidine solution was inoculated and gave the colour reactions shown in the accompanying table:

TABLE II.

Experiment No. 5. Nature of Experiment: To determine optimum concentration of benzidine required in plates for the growth of the pneumococcus with pigment production. Plates used: Agar, 18 cubic centimetres; citrated blood, 2 cubic centimetres; benzidine, 0.5% solution in varying quantities. Pneumococcal strain used (January 4, 1922): Broth inoculated with strain "Bradley." Plates inoculated from broth tube on January 5, 1922.

Quantity of Benzidine Solution.	January 6, 1922.
1 c.cm.	Slight inhibition, good blackening, no ring formation
0.5 c.cm.	No inhibition, good blackening, ring formation
0.25 c.cm.	No inhibition; brown colour round colonies; ring formation; blue colour was distinct by reflected light
0.125 c.cm.	No inhibition; light reddish brown colour showed round colonies; ring formation present; blue colour was faintly visible by reflected light

From which it is evident that with a quantity as small as 0.125 cubic centimetre of this 0.5% solution in a plate having a total volume of approxi-

TABLE III.

Experiment No. 7. Nature of Experiment: To determine (i.) the effect of varying the concentration of blood in benzidine blood-agar plates on the colour of the colonies of the pneumococcus and (ii.) whether two cubic centimetres of benzidine solution will inhibit growth under the conditions of experiment. Strain: "Wood" (pneumococcus). Plates used: Agar constant, eighteen cubic centimetres; benzidine solution and citrated blood as shown below. Plates inoculated from a twenty-four hours' broth January 19, 1922.

Plates Made.	January 20, 1922.
1. Citrated blood, 2 c.cm.; benzidine solution, 2 c.cm.	Pin-point colonies; blackening
2. Citrated blood, 2 c.cm.; benzidine solution, 1 c.cm.	Colonies which are larger than in Plate 1 show good blackening
3. Citrated blood, 1 c.cm.; benzidine solution, 1 c.cm.	Colonies slightly smaller than in Plate 2 show good blackening shading to brown on edge
4. Citrated blood, 0.5 c.cm.; benzidine solution, 1 c.cm.	Colonies very similar to Plate 3; hæmolysis and blackening visible round a few colonies
5. Citrated blood, 0.25 c.cm.; benzidine solution, 1 c.cm.	Most colonies very similar to Plate 3; a few pin-point colonies showed little or no blackening; some larger colonies showed hæmolysis and blackening; blood colour hardly visible in plate

mately twenty cubic centimetres it is still possible to get the colour reaction. This concentration was approximately one of benzidine in 32,000 of medium.

Streptococcal strain "Walker" was tried in a similar experiment, the results of which did not differ materially from those obtained with the pneumococcus.

An experiment was then tried to determine the minimum quantity of blood which was necessary to give the coloration. From this it is seen that plates with a quantity as small as 0.25 cubic centimetre of citrated horse blood are still able to give a slight colour reaction. It only appears definitely in the case of the larger colonies and it cannot be recommended for routine use. These results are shown on the accompanying protocol (see Table III.).

Similar results were obtained in the case of the streptococcus. It thus appears that 0.25 cubic centimetre of a 90% dilution of horse blood in 16% citrate is sufficient to give the blackening under the conditions of experiment.

After consideration of these results, therefore, a medium containing eighteen cubic centimetres of agar, one cubic centimetre of citrated horse blood and one cubic centimetre of 0.5% benzidine solution has been selected for routine purposes. On this medium pyorrhœal material, discharge from urethritis and the fæces of normal persons have been plated out, the results of which examinations lead us to believe that the medium will be of real value in practical work. These results will form the substance of a subsequent communication.

An attempt was made to demonstrate the pigment producing power of the pneumococcus in benzidine blood broth. For this purpose one cubic centimetre of citrated blood and one cubic centimetre of benzidine solution were added to a tube containing ten cubic centimetres of ordinary nutrient broth. Two such tubes were made; one was inoculated with the pneumococcus and one was not inoculated. Both were incubated at 37° C.

The sedimented red cells in the case of each tube darkened slightly. Above the sedimented red cells in the case of the inoculated tube there was a zone of pink hæmolysis.

The broth throughout was slightly darkened in both tubes, but more so in the inoculated tube, while near the surface in the case of the inoculated tube a very dark brown zone was present, which was absent in the uninoculated control.

Two other tubes of blood broth were used as further controls without having benzidine put into them, one being inoculated with pneumococcus and the other being uninoculated.

No darkening of the supernatant broth occurred in either. Slight hæmolysis occurred in the inoculated tube above the red cells.

From this experiment we see that this reaction can be produced by the pneumococcus growing in liquid medium, *viz.*, in benzidine-blood broth, and that it shows itself essentially by the occurrence of a dark zone at the surface of the broth and increased darkening throughout the broth over against the control.

PART III.

It having been demonstrated that the pneumococcus was able to give the typical colour reaction on citrated blood-agar plates containing aniline or benzidine, an attempt was made to ascertain whether the toluidines would be acted upon in a similar manner.

For this purpose 1% ortho- and meta-toluidine solutions and a solution of para-toluidine saturated at 22° C. were made up and added to citrated blood-agar plates. As in the previous experiments, the total quantity of citrated blood-agar in each plate was twenty cubic centimetres. The pneumococcal plates with one or two cubic centimetre quantities of ortho-toluidine solution disclosed, after incubation at 37° C., dark brown colonies which by reflected light showed the bluish metallic lustre. Similar results were obtained with meta-toluidine and to a slighter degree with para-toluidine. These three substances were then added to plates of citrated blood-agar on which *Bacillus typhosus*, *Bacillus diphtheriae*, *Bacillus coli* and *Staphylococcus albus* were grown, but in no case did the characteristic pigment reaction appear.

Of the aromatic amines tested, benzidine appears to be the most suitable for practical purposes and for ascertaining whether any given organism can produce the pigment reaction.

PART IV.

Nature of the Reaction.

It is well known that the oxidation of aniline produces pigments and it appeared likely that the pigment reaction which was obtained with aniline was essentially an oxidation. On that account efforts were made to grow the pneumococcus in an atmosphere with a low oxygen tension to see if by that means the pigment reaction could be abolished, although the growth of the organism was maintained.

Conditions of partial anaerobiosis were obtained by simple exhaustion of an anaerobic jar by means of a water pump; the manometer connected with the vacuum measured 730 millimetres of mercury at a temperature of 22° C.. In these conditions good pigmentation was still obtained around the colonies of the pneumococcus growing on blood-agar plates. The pigmentation, however, was not quite so marked as that which occurred in the case of a similar experiment where the pressure in the partial vacuum was only 680 millimetres of mercury less than atmospheric pressure.

Efforts were made to carry out partially anaerobic experiments in aniline blood-agar shake cultures, but here again it was not possible to get good growth and to prevent the pigment reaction.

Under strict anaerobic conditions in a vacuum with alkaline pyrogallate solution the pneumococcus would not grow on blood-agar.

On the other hand the streptococcus, which was tested, had the power to grow, though not luxuri-

antly, under these strict anaerobic conditions; it was not, however, suitable for this work, for the pigment production by the streptococcus under aerobic condition was, as has been shown, sometimes more or less erratic. Anaerobic experiments that were conducted with the streptococcus lent support to the view that the oxygen of the air was necessary for the reaction, for pigmentation did not occur with the best anaerobic conditions, but growth also was restricted.

Because a transparent medium would be preferable to an opaque medium and on theoretical grounds, an effort was made to replace the blood by an alcoholic extract of the potato. The active principle of this extract forms part of the oxydase system existing in the potato and is capable of being oxidized or reduced, the reduction occurring by means of the "peroxidase" enzyme. The extract was made according to the method of M. W. Onslow⁽⁶⁾ (1919).

Plates containing agar, extract of potato and aniline gave very poor growths of the streptococcus. One plate, however, containing two cubic centimetres of extract, one cubic centimetre of aniline and eighteen cubic centimetres of agar, though it gave a very poor growth of the organism, did show a slight pigmentation around the individual colonies.

The streptococcus on a control plate with potato extract and agar, but no aniline, gave likewise a poor growth but no pigmentation. No evidence was obtained that such an alcoholic extract of potato could efficiently replace blood in the obtaining of this reaction.

Experiments were undertaken to ascertain the effect of pneumococcal antiserum upon the colour reaction produced by the organism. In one case the serum was mixed with the inoculum before the latter was spread on the blood-agar plate; in the second case it was added as a constituent to the medium. The serum was not found in these circumstances to have any inhibiting effect upon the pigment production.

The amount of antiserum added to the plates varied from 0.5 cubic centimetre to three cubic centimetres, the volume of aniline blood-agar in each plate being twenty cubic centimetres. The pneumococcus ("Reid" type) was able to produce very marked pigmentation on aniline blood-agar in the presence of the antiserum.

It was shown in 1907 by D. and M. Rywosch⁽⁷⁾ that the pneumococcus (Friedländer ?) produced a catalase. In order to demonstrate the existence of bacterial catalase these workers grew different bacteria on agar plates and removed the growth by means of a spatula. The mass was quickly weighed in a suitable glass tube which was placed in a flask. A known quantity of hydrogen peroxide solution was then added and the flask closed by a rubber stopper, perforated with a glass tube leading to a eudiometer.

One milligramme of bacterial growth was found able to liberate 2.1 cubic centimetres of oxygen in the case of the pneumococcus; in the case of *sarcina* seven cubic centimetres of oxygen were liberated in a similar experiment, whereas *Bacillus typhosus*

under the same conditions was only able to liberate 0.1 cubic centimetre.

In January, 1922, McLeod and Gordon⁽⁸⁾ brought forward evidence in favour of the view that the pneumococcus produces a peroxide; they found that abundant oxygen was required for its production.

The peroxide was thermo-labile and completely destroyed in half an hour at a temperature of 85° C.. They found it in filtrates of cultures treated with alcohol to remove the protein and they were able to concentrate it by distillation at a low temperature.

These filtrates, on being added to blood, caused an evolution of gas. They found that peroxide was most effectively produced in 10% serum broth spread out as a shallow layer at the bottom of Erlenmeyer flasks. The serum used in making the broth was freed from catalase by heating before use. After these flasks were inoculated with the pneumococcus and incubated twenty-four to forty-eight hours the broth they contained showed definite antiseptic properties and on the addition of liver catalase oxygen gas was evolved.

McLeod and Gordon further state that the pneumococcus, some streptococci and also sarcina produce this peroxide.

It has been shown in this paper that the pneumococcus and the streptococcus give the pigment reaction. Examination of the urethral discharge obtained from cases of chronic gonorrhœa after massage of the prostate showed that certain sarcinae occurring in that discharge were likewise able to give the colour reaction.

It is rather interesting to note that the organisms we have found to give the colour reaction correspond with the organisms found by McLeod and Gordon to produce peroxide. Further, it is well known that blood in the presence of benzidine and peroxide will give a striking blue colour reaction, so that the most probable explanation of our colour change would be to suggest that the organisms giving this colour change do so by virtue of the peroxide that they produce. It is not evident why the catalase found by D. and M. Rywosch does not decompose the peroxide formed and prevent the accumulation of it described by McLeod and Gordon. This point requires elucidation.

It may appear strange that they (McLeod and Gordon) required free access of oxygen for the production of peroxide, while in the case of the work here recorded, with high degrees of partial anaerobiosis, the pigment production could not be arrested. This difference is probably due to the fact that these workers worked with broth cultures, while the work herein described has been done with surface cultures.

We believe, therefore, that information of this peroxide-producing property of some organisms can be obtained by the simple process of growing the organisms on blood-agar to which benzidine has been added. This reaction, moreover, will enable us in examining pathological material and secretions, firstly, to select readily the pneumococcus, streptococcus and sarcinae which give these reactions and, secondly, to isolate or, if it be desired, to avoid those numerous organisms which we have tabulated which do not give the reaction. It seems highly probable that in the examination of possible meningococcal

carriers the use of benzidine-blood-agar would reduce to a minimum the amount of work involved, for it would be possible to concentrate on the relatively few non-pigmented colonies, amongst which the meningococci would be found.

Innumerable other applications of this colour reaction in practical bacteriology suggest themselves, but it is premature to form an opinion of their value before they have been actually used in a long series of cases in field work.

Conclusions.

(1) All pneumococci and probably all streptococci act on certain aromatic amines, notably, aniline, benzidine and the toluidines, producing pigment.

(2) The pigments are probably due to the oxidation of the amino-bodies by the peroxide produced by these organisms.

(3) This aniline pigment production serves to separate the pneumococcus and streptococcus from the great majority of pathogenic organisms and may possibly be profitably applied in field work for the detection of both the aniline-pigment-forming and the aniline-non-pigment-forming bacteria.

(4) Benzidine is the best of the aromatic amines for the purposes of this test.

(5) Eighteen cubic centimetres of nutrient agar, one cubic centimetre of citrated horse blood and one cubic centimetre of 0.5% benzidine solution constitute an excellent medium for obtaining this reaction.

Acknowledgements.

I desire to express my deep obligation to Mr. F. J. Considine for the purification of the aniline used in the work. It conformed to the requirements of Merck's tests for this reagent. Two samples of benzidine were used and gave identical results. For one of these samples I am indebted to Dr. W. J. Young, Lecturer on Biochemistry, University, Melbourne, who, moreover, kindly supplied samples of one or two other reagents.

Messrs. R. Newton, Technician-in-Charge of the Diagnosis Laboratory, J. D. Whitelaw and J. B. Penfold collaborated with me in the work of Parts I., II. and III. of this paper respectively and to them my best thanks are due.

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Reports of Cases.

A CASE OF ACUTE SYPHILIS OF THE CENTRAL NERVOUS SYSTEM.

BY IDRIS MORGAN, M.B., CH.M.,

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SYPHILIS is generally regarded as a comparatively slowly progressive infection, characterized in some cases by long periods of inactivity. Occasionally it presents a clinical picture of acute disease with pyrexia, convulsions, etc..

Congenital syphilis, as is well known, produces acute and fatal illnesses. Such acute conditions are rare in adults infected with syphilis. The following case seemed to me of sufficient interest to warrant publication, as it illustrates what may be called a condition of acute fulminating syphilis of the central nervous system:

S.D., aged twenty-one years, a labourer, was admitted to Newcastle Hospital on June 17, 1922. A history obtained from the patient's relatives was as follows:

The illness commenced fourteen days before admission with severe headache, twitching of the right side of the face and "dead feeling all over." The relatives noticed that the corner of his mouth was drawn round to the right side when he smiled and that he became giddy on turning quickly. He vomited for three days; the vomitus was green in colour. Six days prior to admission he had pain in the left side "below the ribs." His stools were watery for a day or two before admission, but not unduly frequent. He became drowsy and "slept practically all the time, as if in a stupor." He had had typhoid fever eight years ago. There was a history of a blow behind the ear "about a month ago."

On admission the temperature was 38.2° C. (99.8° F.) and the pulse-rate 88. The patient lay perfectly motionless in bed, his eyes half closed and presented the "ironed-out" facies of double facial palsy. He took no notice of things going on around him and was disinclined for food. He answered questions correctly and intelligently, but with a marked delay (ten to twenty-five seconds between question and answer). There was a definite double facial paresis. A history of diplopia was elicited from the patient himself and was found to be present on examination. His pupils reacted to light and accommodation fairly well. The knee-jerks were very feeble.

The tongue was thickly furred and sordes were present on the lips. There was no vomiting; the bowels had been opened by enemata for the three days prior to admission. The spleen was not palpable; there was no enlargement of the liver. The abdomen was not distended. There was no tenderness or rigidity. No roseolar rash was present. He was able to move his limbs slowly and stiffly; the movement was that of a man exhausted by a long illness. There was no actual paralysis or loss of sensation. He was able to approximate the tips of his index fingers accurately. No abnormality was detected in the lungs and heart. The pulse was strong and of a "water-hammer" character.

A Widal test was performed at once, but no reaction was obtained. A blood count yielded the following information: There were 5,340,000 red blood corpuscles in each cubic centimetre of blood. The hæmoglobin value was 92% and the colour index 0.86. The white corpuscles numbered 17,500. Of these 96% were neutrophile leucocytes, 2% small lymphocytes, 1% large lymphocytes and 1% eosinophile cells. A culture tube was inoculated with blood, but remained sterile.

The next day the patient's general condition was decidedly worse, although he was still able to answer questions and exhibited the same delay in doing so.

An examination of the ears and nasal sinuses revealed no abnormality. The rapidly fatal issue prevented an examination of the fundi and the application of the Wassermann test to the blood.

A few hours after admission a lumbar puncture was performed and twenty cubic centimetres of fluid withdrawn under considerably increased pressure. The fluid was clear and on examination was found to contain a few red blood cells and lymphocytes. A provisional diagnosis was made

of (i.) cerebral abscess, (ii.) syphilis of the central nervous system, (iii.) *encephalitis lethargica*.

During the night the patient rapidly became cyanosed and died on the third morning after admission of what seemed like a paralysis of the respiratory centre. The temperature rose to 38.9° C. (102° F.) shortly before death.

Post-Mortem Examination.

Brain.

There was slight congestion of the whole organ, but no petechial hæmorrhages. Marked congestion of the choroid plexus was noted. There were no gross or macroscopic lesions discovered on section. No evidence was discovered of traumatic lesion of the skull.

Heart.

Marked early atheroma was seen of the aortic wall just above the situation of the aortic valves.

Other Organs.

The liver was slightly congested. There was no evidence of typhoid or paratyphoid infection of the bowel. A few pigmented and slightly enlarged lymphatic glands were seen in the mesentery. The other organs were normal. The Wassermann test of the cerebro-spinal fluid yielded a marked reaction ("+++"). A second test gave the same result.

Comment.

The presence of aortitis in a man of twenty-one years of age, strongly positive Wassermann reaction of the cerebro-spinal fluid and the obvious infection of the central nervous system led us to make the diagnosis of acute syphilis of the central nervous system. No other pathological lesion could be found. It seems reasonable, therefore, to conclude that death was caused by the toxins of *Treponema pallidum*. While numerous cases of acute illness caused by pre-existing syphilis and following parturition, influenza, etc., are on record, I think an acute and fatal condition such as this was, commencing in an otherwise healthy individual and caused, apparently, by syphilis alone, is rare.

Reviews.

LABORATORY METHODS OF DIAGNOSIS.

Two books, probably the most widely used in general hospital laboratories and by practitioners interested in laboratory methods, have reached their sixth editions in the course of a few years. These books are published in London and Philadelphia respectively. One or the other is to be found on the laboratory shelf or bench wherever English is spoken. It is interesting to note that the London publication remains rather conservative and, we regret, tends sometimes to hang on to bad old methods in neglect of good new ones. Not so with the sixth edition from Philadelphia, which embraces all the newest methods and is astonishingly *au fait* with them, considering it covers such a wide field, much wider, be it remembered, than Dr. D'Este Emery's book.¹ It would be desirable if Dr. D'Este Emery requisitioned the services of younger men to re-write special sections of his book, in order that it may retain its place. The book should not be discarded hurriedly, because there is much that is good in it. But the sixth edition is, on the whole, decidedly disappointing. For example, there is no mention of meningococcal or pneumococcal types. The author states that when the pneumococcus is found in the blood stream (in pneumonia, septicæmia or ulcerative endocarditis), "it always indicates a bad prognosis and suggests the use of vaccine." The fact that the prognosis depends also on the type of pneumococcus found and the claims of specific

¹ "Clinical Bacteriology and Hematology for Practitioners," by W. D'Este Emery, M.D., B.Sc. (Lond.); Sixth Edition; 1921. London: H. K. Lewis & Company, Limited; Demy 8vo., pp. 310, with eleven coloured plates and fifty-five illustrations. Price: 15s. net.

serum therapy, are quite overlooked. Dr. D'Este Emery appears to favour vaccine treatment rather than serum for the majority of infections. The present-day view is that vaccines are to be preferred in acute infections only until satisfactory sera or specific chemical bactericidal agents are available.

Again, Emery describes two methods of performing the Wassermann test—his own and that of McIntosh and Fildes. No mention is made of the improved acetone-insoluble antigens or of the ice-box method. The discussion on the interpretation of the reaction is good.

Dr. Stitt's discussion¹ of this reaction is, however, wider in scope and gives what is lacking in Dr. Emery's manual. He is rather unfortunate, however, in his selection of methods. After summarizing the statistical results, he goes on to say that "it is generally accepted that in this laboratory test we have our most important single evidence of syphilis." Experienced clinicians agree with this statement, provided that the Wassermann test is intelligently and honestly carried out.

Dr. Stitt gives a short description of the complement deviation test in gonococcus infections, but gives no interpretation of results. Dr. Emery does not mention this test.

Dr. Emery's treatment of hæmatology, though necessarily very condensed, is generally good. The term hæmatology should, however, now include more than the pathological histology of the blood. It should include the normal and morbid chemistry of the blood.

Dr. Stitt concludes with a number of very useful chapters on various infective diseases, including tropical diseases and helminthic diseases. He also adds a good chapter on diseases of unknown or not definitely determined ætiology. Finally, there is an excellent appendix, a *vade mecum* for all sorts of microscopical and chemical methods and tables of anatomical and physiological normals, etc..

It seems to us that Dr. Stitt gives better value at the price for general practitioners, consultants and laboratory workers. He is certainly more in touch with recent research and with recent improvements in technique.

Dr. Emery's book is published for practitioners, but we should rather recommend it to medical students, reserving Dr. Stitt for practitioners and laboratory workers.

SURGERY OF THE RECTUM.

THE "Handbook on Diseases of the Rectum," by Louis J. Hirschman is a work which has been written for general practitioners as well as for those surgeons who specialize in rectal work.²

The author has devoted a large part of the book to methods of diagnosis in the more common diseases of the rectum. The proper way in which a patient should be examined with the sigmoidoscope, is given in detail with illustrations. Many other painstaking methods are outlined. There is no doubt that these methods should always be substituted for the usual perfunctory examinations of the rectum, which, as every surgeon knows, has been a fruitful source of many a grievous error.

Dr. Hirschman apparently does much more minor surgery of the rectum in his consulting rooms than is usually done. He accomplishes this by the aid of local anaesthesia, with which he is able to perform many operations usually carried out under general anaesthesia.

His methods of treating such fractious diseases as *pruritus ani*, simple and tuberculous anal fistula, are interesting and will be found of value.

There is a useful chapter on the treatment of dysentery.

¹ "Practical Bacteriology, Blood Work and Animal Parasitology, including Bacteriological Keys, Zoological Tables and Explanatory Clinical Notes," by E. R. Stitt, A.B., Ph.G., M.D., Sc.D., LL.D.; Sixth Edition, Revised and Enlarged; 1920. Philadelphia: P. Blakiston's Son & Company; Demy 8vo., pp. 633, with one plate and 177 other illustrations containing 637 figures. Price: 18s. net.

² "Handbook of Diseases of the Rectum," by Louis J. Hirschman, M.D., F.A.C.S.; Third Edition, Revised and Rewritten; 1920. St. Louis: C. V. Mosby Company; Melbourne: Stirling & Company; Royal 8vo., pp. 378, with 223 illustrations and four coloured plates. Price: 27s. 6d..

A feature of the book is that a large part of it is devoted to a discursive, non-operative treatment, a good deal of which has been evolved from the author's own observations and experience. This will suggest many fresh points of view to the reader.

The book is profusely illustrated and will be found most useful because it deals with a phase of rectal work not usually touched upon in surgical works.

VENEREAL CLINICS.

"THE VENEREAL CLINIC," by several writers,¹ is as stated in the introduction a precise and up-to-date manual for the general practitioner and student attending venereal disease clinics. The book is divided into two parts. Part I. deals with the medical aspect of venereal diseases, while Part II. contains short descriptions of the sociological and administrative efforts adopted for the prevention of venereal diseases.

A concise and systematic description of the pathology, diagnosis and treatment of syphilis in its various stages is given. On page 69 a prescription for the treatment of syphilis is given incorrectly. "*Hydrarg. perchlor.*" should read "*liquor hydrargyri perchloridi.*" The pathology, diagnosis and treatment of gonorrhœa in the male and in the female is carefully described.

A short chapter is devoted to bacteriology, including the laboratory methods of diagnosis of gonorrhœa and syphilis.

Part II. of the book, dealing with the sociology and administrative aspect of venereal diseases, should prove of great service to all who are interested in social welfare.

The appendices contain much information and many useful tables of dilutions, etc..

The illustrations, coloured and otherwise, are excellent.

The book contains a large amount of very useful and thoroughly up-to-date information in a small space. The chapter on gonorrhœa in women is a welcome addition to an otherwise excellent manual.

PERMEATING MASTOID MENINGITIS.

A SERIES of papers by J. B. Pike on permeating mastoid meningitis, which appeared in *The Practitioner*, has now been presented in booklet form.³ It is primarily designed to focus attention on this insidious, elusive and dangerous form of microbe infection of the mastoid which permeates the mastoid bone in the direction of the periosteum of the cerebral surface, threatening meningitis and brain abscess. Owing to the absence of any very definite localizing symptoms, operation may be postponed until the damage is irreparable.

Pike holds that an exploratory mastoidectomy should always be made in the case of a child who has had attacks of earache and probably headache, who seems listless and lethargic, with slight rise of temperature and nausea and possibly some obscure tenderness over the mastoid. He describes his technique. A number of cases illustrating the condition is given in the text as well as in an appendix and in a second appendix John Burgess, F.R.C.S., adds two typical instances in illustration of the thesis. The little volume will serve an excellent purpose if it impresses on aural surgeons and others the possibility of this complication in aural affections of doubtful nature.

¹ "The Venereal Clinic," by Several Writers; Edited by Ernest R. T. Clarkson, M.A. (Cantab.), M.R.C.S., L.R.C.P., with an Introduction by Sir Squire Sprigge, M.D.; 1922. London: John Bale, Sons & Danielsson, Limited; Demy 8vo., pp. 477, with eleven coloured and nine other plates. Price: 25s. net.

² "Permeating Mastoid Meningitis: A Clinical Note for the General Practitioner," by J. B. Pike, M.R.C.S. (Eng.), L.R.C.P. (Edin.); 1921. Bristol: John Wright & Sons, Limited; London: Simpkin, Marshall, Hamilton, Kent & Company, Limited; Crown 8vo., pp. 24. Price: 1s. net.

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Serum Treatment of Pneumonia.

THE members of the Victorian Branch of the British Medical Association recently discussed the subject of acute pneumonia and naturally focussed their attention chiefly on the therapeutic value of anti-pneumococcic serum. Dr. S. W. Patterson has collected much valuable clinical data and has presented the material in an admirable manner. Unfortunately, however, the information available at present is not sufficient to enable anyone to arrive at a definite conclusion concerning the value of this serum in the treatment of acute pneumonia as it exists in Australia to-day. It will be remembered that since the year 1913, when Dochez and Gillespie, in the United States of America, and Lister, in South Africa, produced their evidence of the existence of separable types of pneumococci, bacteriologists the world over have been at pains to utilize the fact that the immune bodies produced in response to the injection of each definite type are highly specific, at all events when tested for agglutination. Dr. Patterson has shown that 43% of the pneumococci recovered from the sputum or from the lungs of persons affected with pneumonia at the Melbourne Hospital belonged to Type I.. The frequency of occurrence of Types II. and III. is probably low. The number of times these types have been found is so small that no reliance can be placed on the percentage figures. It would seem that Type II. is more frequent than Type III.. Rather more than one-third of all the pneumococci found belonged to the large group of ill-defined cocci classed as Type IV.. Elsewhere it has been found that pneumococci of Type I. represent about one-third of all the infecting pneumococci. In America Type II. appears to be considerably more common than in Australia. These observations are of considerable importance. Dr. W. J. Penfold has found, as others have found in other countries, that Type I.

pneumococci yield an antiserum of high agglutinin titre, while less satisfactory results are obtained with Types II. and III.. For the present, therefore, the serum treatment of pneumonia must be restricted to infections with Type I., that is, between one-third and one-half of all cases of lobar pneumonia in Australia. It is, of course, not excluded that a group action may be exercised by either a Type I. antiserum or by a so-called polyvalent serum, nor is it impossible that a non-specific protein reaction may have some therapeutic value. While Type I. pneumococci are more frequent than pneumococci of other types in Melbourne and Sydney, it would seem from American statistics that the pneumonia caused by this type is less fatal than that caused by Types II. and III.. According to Dr. Patterson's figures, this would not obtain in Melbourne, but in view of the very small number of ascertained Types II. and III. infections, this question will have to be left an open one pending further information. The influence of other factors on the mortality should not be ignored. Dr. Patterson draws attention to the fatality rate according to the site of invasion and according to the extent of the local inflammation. He attaches importance to the association of empyema with the pneumonia. Whether there is any tendency for more lung tissue to be involved in infections with one of the types as compared with infection of other types is not shown. The prognosis of empyema does not appear to be influenced by the bacteriological types.

It is claimed by Dochez that the mortality in Type I. pneumonia can be reduced by specific anti-bacterial serum from 25% to 7.7%, while Lister reported a reduction by serum treatment of mortality among Rand miners suffering from pneumonia from 49% to 20%. The Australian figures are inconclusive and must be supplemented. Every year hundreds of patients are admitted to the large metropolitan hospitals. It is not too much to demand that a collective investigation should be undertaken by the medical officers in charge of these institutions. Every pneumonia should be studied bacteriologically in order that the exact nature of the infecting organism can be ascertained and the infections classified. In such an investigation Dr. Penfold's ingenious cultural reaction to aniline,

benzidine and toluidine could be employed for the purpose of distinguishing pneumococci from streptococci. In the next place, Dr. Patterson's suggestion of employing anti-pneumococcal serum, normal horse serum and expectant methods in regular alternation should be carried out. It would perhaps be advisable to use Type I. serum exclusively for all patients suffering from pneumonia caused by Type I. pneumococci until sufficient evidence is amassed to settle the question of its specific therapeutic value. The mortality of pneumonia is too high to justify the present attitude of the medical profession toward this disease. Individual practitioners claim satisfactory results for various methods of treatment, but the evidence presented on the basis of a handful of cases is quite unreliable. The only scientific and rational procedure is to institute an organized attack on a large scale. If a coordinated plan of investigation were arranged, so that advantage were taken of the large number of patients admitted to the chief hospitals in the capital cities of the six States, the personal element would be eliminated and within a relatively short time tangible results would be obtained.

THE TREATMENT OF GENERAL PARALYSIS OF THE INSANE.

PATHOLOGISTS and clinicians alike appear to resist the conclusion dictated by experience that the prognosis of general paralysis of the insane is hopeless. Ever since it was recognized that this disease was a manifestation of a syphilitic infection, endeavours have been made to apply specific remedies in such a manner that their effect may be directed to the central nervous system, the seat of the pathological process. It is interesting to recall that even before the association between general paralysis and syphilis was demonstrated, this condition was treated by empirical remedies, including tartar emetic. In the light of modern doctrines of pharmacology, it would seem that antimony and arsenic exert a direct action on the spirochaetes. At a later date close study of locomotor ataxia and general paralysis revealed a peculiar relationship with syphilis. For many years it was held that these two conditions were para-syphilitic, by which was understood that they were indirect sequelae, not directly caused by the infecting organism. The outlook was regarded with something approaching despair, for it seemed as though the beginnings were enshrouded in obscurity and when the disease had manifested itself in clinical signs and symptoms, it was too late to remedy the gross changes in the delicate nervous tissue. Since Hoffmann and Schaudinn's epoch-making discovery of the *Spiro-*

chaeta pallida, it has been found that the changes in both conditions are produced by the parasite itself. The introduction of Levaditi's method of demonstrating spirochaetes in microscopical sections brought about a complete change of attitude toward these diseases. The result of this demonstration was a feverish campaign of medication with mercury and later with the arseno-benzol drugs. In some instances improvement seemed to follow the medication; the improvement often lasted for a considerable time. More deliberate and more critical consideration, however, taught clinicians and therapeutists that it was by no means proven that these remissions were produced by the medication. At times prolonged periods of apparent recovery occur spontaneously. It should be admitted that many observers have put forward claims of undoubted benefit derived from specific remedies in general paralysis of the insane. The names of Marinesco, Swift and Ellis, Wechselmann, Hammond, Ballance and Campbell, Marie and many others are included in the list. The findings of neurologists of eminence cannot be brushed aside lightly, although we have a right to claim of even the most prominent authority definite proof of a therapeutic action.

Professor W. Weygandt has recently dealt with the question of the treatment of general paralysis of the insane.¹ His long association with a large mental hospital near Hamburg and his reputation as a careful and competent observer lend weight to his critical survey of the literature of this subject. His own contributions, based as they are on a large experience, also command respect. Professor Weygandt is no friend of mercury medication in general paralysis. He seeks and finds some grounds for placing salvarsan among the useful drugs to be tried in this desperate disease. The claims made of extraordinary success with the arseno-benzol drugs are met with somewhat cold acceptance of the fact that remissions often follow their application. In the next place, Professor Weygandt speaks of three classes of non-specific agents which have been applied in this disease. The first embraces certain chemical substances known to possess the property of stimulating the cerebral centres. The second includes various proteid derivatives of pathogenic bacteria. Nucleic acid and its salts, certain albumoses, chaulmoogra oil and the like have been tried, at times with seeming success. These substances are endowed with the action of fever producers. Tuberculin and typhoid vaccines have yielded some promising results, although but few patients have been benefited for long periods. The most interesting method of treating general paralysis of the insane is by transmitting the plasmodium of malaria by injecting from 0.2 to 2 cubic centimetres of the blood of a person suffering from malaria and leaving the patient untreated until he has had several attacks of ague. This method is contra-indicated in a district where anopheline mosquitoes abound. Professor Weygandt has applied it to a large number of patients and states that total disappearance of symptoms has followed in 72.5%. He admits that spontaneous improvement occurs in about

¹ *Münchener Medizinische Wochenschrift*, February 24, 1922.

11.7% of all patients and is prepared to make further allowance because of his selection of cases. He holds that his results are 40% better than those obtained in other ways. Under some circumstances he combined tuberculin treatment or injection of typhoid vaccines with the malaria inoculations.

THE INFLUENZA BACILLUS.

THE controversy concerning the relationship of Pfeiffer's bacillus and influenza is not yet dead. During and immediately after the pandemic of 1918 the champions of the ultra-microscopic virus hypothesis sought to silence those who held that influenza was caused by Pfeiffer's influenza bacillus by arguments of exclusion. The influenza bacillus could not be the causative organism, because the disease could be reproduced by the injection of nasal and faucal washings after filtration through a porcelain filter. Unfortunately, the evidence of Nicolle and Lebaill, of Gibson, Bowman and Connor and of Bradford, Bashford and Wilson has not been accepted. With the failure to substantiate their claims, the criticisms levelled by these observers and their followers against the protagonists of the Pfeiffer doctrine lost their trenchant and convincing force. Cold, impartial examination of the facts has lent support to the belief that, notwithstanding the frequency of the association of the influenza bacillus and certain other organisms with epidemic influenza, the real cause of the disease has not yet been discovered. Against the assumption that the influenza bacillus is the causal organism is the fact that the same bacillus has been discovered in association with many other pathological conditions, especially those affecting the respiratory organs. Then it is a significant thing that attempts to reproduce the disease in man by the introduction of Pfeiffer's bacillus into the upper respiratory passages has met with failure. In the third place, there is reason to state that persons harbouring the influenza bacillus in their throats after an attack of the disease during the epidemic mixed with the general population apparently without spreading the disease.

While it is probable that the bacillus of Pfeiffer is but a secondary invader, its significance in this rôle is by no means devoid of interest. Dr. Arthur L. Bloomfield, an old-time opponent of Pfeiffer's claims, has continued to study this organism and to ascertain its exact relations to epidemic influenza. He has some interesting messages to give.¹ It is unnecessary to follow Dr. Bloomfield through his maze of arguments directed toward the refutation of the contention that the influenza bacillus is the causal organism of influenza. They have all been produced before. Mention should, however, be made of the recent work that has been conducted in regard to the biological attributes of the bacilli. Park, Coca and others have proved that influenza bacilli exist in varying forms and that each form or strain yields serological responses of an unmistakable kind. Dr. Bloomfield is unable to conceive that a

bacterium which exists in so many varieties, can be responsible for a disease as highly specialized as epidemic influenza. Having arrived at this obvious conclusion that the influenza bacillus does not cause the disease, he sought to ascertain whether it was a more frequent parasite during the epidemic than before and since. A somewhat meagre record of the pre-epidemic frequency of influenza bacilli in the throats of healthy persons seems to fix the incidence at under 20%. During the pandemic it was found in the throats of apparently healthy people much more frequently. The lowest records yielded a frequency of 35%, while Lord found the bacilli in as many as 76% of the healthy people examined. The bacilli apparently were found as frequently during the two years following the pandemic in the throats of healthy people as during the pandemic. Dr. Bloomfield examined a large number of healthy people in 1921-1922 and found influenza bacilli in 17.3%. Further study revealed the fact that while the bacilli were found for short periods in the throats of apparently healthy people as a rule, the carrier state sometimes persisted for a long time. Artificial inoculation usually resulted in the rapid disappearance of the bacilli. At times, however, the carrier state was produced and persisted for weeks and even months. Dr. Bloomfield investigated the site of the bacilli in the throats of occasional carriers, but found that there was no persistent localization and that the bacilli may be found in one tonsil at one time and in the pharynx at another. From these data he has come to the conclusion that, unlike *Streptococcus viridans* and certain other bacteria, the influenza bacillus has a very slight power of adapting itself to the conditions obtaining in the healthy human throat. It does not appear to be possessed of any special pathogenic qualities. In the absence of epidemics it is found from time to time in the throats of few people. The presence of a focal infection seems to alter the soil in such a manner that the bacilli are able to gain a better hold. The influenza bacillus has been found in the throat of persons suffering from measles; during the eruptive stage the incidence was as high as 75%; after forty days none of the patients examined harboured any. Similarly, in influenza the incidence of the bacillus in the throat was very high, often as high as 100%. In other words, the adaptation of the influenza bacillus to the mucous membrane of the human throat is temporarily very definite. This adaptability persists for a short time in the case of morbilli, but after influenza it may last for two years. The bacilli do not undergo sufficient change in the throats of persons suffering from morbilli to enable them to adapt themselves to the conditions of the throats of healthy persons. The sojourn in the throat of the patient with influenza, on the other hand, seems to influence the bacilli to acquire the qualities necessary for a saprophytic existence in a healthy throat. This doctrine of Dr. Bloomfield is ingenious and suggestive. If it be true, it would mean that the bacillus of Pfeiffer has no pathogenic significance and that it plays the part of the rabble that presses in whenever there is a disturbance and delights in making a noise while others are fighting. It may be so.

¹ Bulletin of the Johns Hopkins Hospital, May, 1922.

Abstracts from Current Medical Literature.

MEDICINE.

Infections of the Heart.

CAREY F. COOMBS (*Quarterly Journal of Medicine*, January, 1922) reports certain investigations in connexion with streptococcal infections of the heart and rheumatic carditis. He describes nodules occurring in the interstitial tissue of the heart in acute rheumatic carditis of children. These nodules are mainly composed of fibrin, leucocytes, plasma cells and large globular or fusiform cells. He regards these globular or fusiform cells as characteristic of rheumatic infections. The nodules occurred in eighteen of twenty-six children's hearts examined; they were not found in adults and were not present in the hearts of patients who died of other infections. Foci similar in essentials to those found in rheumatic carditis were found in the pericardium, endocardium, joints and nodules (subcutaneous) of rheumatic patients. The heart lesions in rheumatic carditis suggest a bacterial infection and many authors have described streptococci found in the lesions. Coombs states that streptococci were found in three of his patients. He considers that the tonsils are the most probable focus of infection. Twenty hearts from patients who had suffered from endocardial ulceration, were examined, in addition to the rheumatic hearts, and the incidence of the lesions was found to be on the valves. The remainder of the heart was little affected and what affection there was appeared to be mainly vascular (embolic or thrombotic). These two findings are contrary to those in rheumatic cases, where the heart wall itself is the site of the most serious lesions. A series of ten rabbits was inoculated with streptococci from various sources and it was found that when lesions occurred they were mainly endocardial inflammation and necrosis and myocardial lesions of vascular origin. The author notes certain similarities in the nature of the lesions in rheumatic and ulcerative endocarditis. He suggests that ulcerative endocarditis is caused by massive doses of streptococci obtaining entrance to the blood stream, causing lesions similar to those produced by intravenous inoculation of animals. He further suggests that rheumatic carditis is due to the entrance of small doses of streptococci over a limited period, causing a general carditis, with specific nodules present in the lesions.

Gastroptosis.

P. C. COURAN (*Quarterly Journal of Medicine*, January, 1922) writes on subject of dropping of the stomach. He discusses the aetiology, X-ray appearances, symptoms, complications and treatment of the condition. The article is based on the study of 684 patients, all of whom complained of

symptoms suggesting derangement of the alimentary canal and all of whom were examined under X-rays for this reason. Of these patients, 150 showed a gastric shadow, the bottom of which appeared about ten centimetres below a line joining the highest points of the iliac crests. Other diseases besides gastroptosis were present in fifty patients and the highest incidence of gastroptosis was in those suffering from pulmonary tuberculosis and arthritis. The condition was three times as common in women as in men and occurred generally in thin people. The symptoms of half the patients were said to have dated from some acute illness. The commonest symptoms were constipation, abdominal discomfort, flatulence, loss of energy, headache, depression, insomnia, anorexia and emaciation. Hypotonus and delay in emptying of the stomach and ileal stasis were commonly found at the radiological examination. Hyperacidity of the gastric contents, low blood pressure and anaemia were common. Treatment consists in the relief of constipation, rest in bed with the foot of the bed raised until symptoms are relieved and there is substantial increase in weight. This requires at least two months. The patient then gradually resumes the normal mode of life. Special attention must be paid to preventing constipation and mild exercise is recommended. Abdominal belts are only useful if the patient cannot undertake the above treatment and are also of service in some elderly people with general visceroptosis. Whenever an abdominal belt is worn, however, a barium meal should be given with the belt in position, to ascertain whether it is serving the purpose for which it is intended.

Functional Thyroid Tests.

N. G. RUSSELL, J. A. P. MILLET AND B. D. BOWEN (*American Journal of the Medical Sciences*, December, 1921) deal with the significance of the tests employed for estimating the functional state of the thyroid gland. These authors examined the basal metabolism, the glucose tolerance and the reaction to adrenalin in eighty-five patients whose symptoms were said to be due to hyperthyroidism or hypothyroidism. A third group included in the above were classified as fatigue cases. The basal metabolism was estimated by Benedict's method; the glucose tolerance was measured by estimating the blood and urinary sugar before and after the ingestion of 1.75 grammes of glucose per kilogram of body weight. The reaction to adrenalin was determined by injecting subcutaneously 0.5 cubic centimetre of a 1 in 1,000 solution of adrenalin chloride and noting the effect on the pulse and blood pressure. It was concluded that the only functional test showing a positive response in all cases of hyperthyroidism was the basal metabolism estimation. This was increased in every instance. Alimentary hyperglycaemia and glycosuria were consistently present in hyperthyroidism; but as they occur in other conditions, were not regarded

as specific tests. The authors consider that the adrenalin test itself affords no criterion of the presence or absence of thyrotoxicosis; but they do think that a decreased metabolic rate, together with improvement after the administration of thyroid, indicates hypothyroidism.

Epidemic Encephalitis.

ISRAEL STRAUSS AND I. WECHSLER (*International Journal of Public Health*, September-October, 1921) have published a paper on epidemic encephalitis based on observations of 200 cases of their own and 664 cases studied by neurologists in Canada and the United States of America. They deplore excessive grouping of the types of the disease and point out that among twenty-six types dealt with in the 864 cases certain features recur frequently, thus showing the commonest localizations of the infective process. The group with somnolence and ophthalmoplegias occurred oftenest; then came the Parkinsonian catatonic and cataleptic group, involving the basal ganglia. The bulb and *pons varolii* were the next most frequently affected and then came the psychotic type, the type showing abnormal movements, the paralytic type and the hyperalgesic varieties. The age incidence was greatest between twenty and sixty. In only 0.5% did the disease occur in two members of a family. The mortality was 20%. Pathologically there occurred intense congestion of the meninges of brain and cord and infiltration with mono-nuclear cells. The main lesions were microscopic and occurred in the medulla and basal ganglia. These comprised small hæmorrhages, infiltration of vessels and the surrounding tissue with mono-nuclear and plasma cells, occasional thrombus formation, small areas of oedema and rarely of softening. Chromatolysis of ganglion cells and neuronophagia were also to be seen. Similar, though less intense, changes were present in the spinal cord. The symptoms were malaise, somnolence, insomnia, neuralgic pains, double vision, inability to read, nystagmus, general rigidity, myoclonic movements. Fever was always present at some stage and facial paresis, Kernig's sign and increased pressure of cerebro-spinal fluid with pleocytosis were common signs. Delirium may appear, but hallucinations and mental symptoms are rare; hyperæsthesia, hemiplegia and paraplegia have occurred; the medulla may be involved, causing dyspnoea, cardiac disturbance or dysphagia. All possible signs of ocular involvement have been observed, but optic neuritis and atrophy are very rarely seen. The authors describe in detail the peculiar characteristic coma and the alterations of the facial expression. Diagnosis may have to be made from tuberculous meningitis, cerebral tumour or abscess, poliomyelitis, polynneuritis, neuralgia, cerebral syphilis, intoxications, chorea, enteric fever, hysteria, neurasthenia and psychoses. Treatment is mainly symptomatic. Urotropine is of no value. Lumbar puncture is useful for diagnosis and for treatment.

NEUROLOGY.

Causalgia and Allied Painful Conditions Due to Lesions of Peripheral Nerves.

H. S. CARTER (*The Journal of Neurology and Psychopathology*, May, 1922), in a long paper on causalgia and allied conditions, concludes that the fundamental lesion is an intraneural and perineural sclerosis and that the irritation set up at the site of injury causes perverted afferent impulses to be sent back to the cord and possibly further to subcortical and cortical centres, whence efferent responses of vaso-dilator, secretory and trophic nature are reflected to the peripheral distribution of the nerve and interpreted as pain. It is difficult to say why lesions of the nerves which pre-eminently are affected, that is, the median and internal popliteal nerve fibres, produce a true causalgia in some cases, pain of less severity in others and in the remainder nothing but the discomfort of partial sensory loss. It is improbable that inflammatory reaction to different groups of organisms is the solution. It is hardly possible that irritation of a special group of fibres is the cause. The most likely assumption is that in these cases there is some peculiarity in the nerve trauma which induces disturbance of those cells in the brain whose function it is to interpret pain. By resection of the irritated and sclerosed portion of nerve, the source of the perverted impulses is removed and the pain vanishes. By restoring the continuity of the nerve, the path for normal impulses is re-made and gradually recovers its conductivity as the nerve regenerates.

Sedative Treatment in Psychiatry.

V. DEMOLE (*Revue Neurologique*, December, 1921), referring to the use of derivatives of urea, such as "Barbitone," "Luminal" and "Dial," in the treatment of states of excitement, delirium and insomnia, points to a product known commercially as "Somnifène" (Roche). This has the advantage of being in liquid form and is therefore suitable for subcutaneous as well as oral administration. He emphasizes its value in certain states of delirium and acute excitement arising in *dementia præcox*. In the specific treatment of patients suffering from these conditions, he begins with an injection of hyoscine and morphine and half an hour later injects four cubic centimetres of "Somnifène." Sleep is induced for about twelve hours and thereafter a state of somnolence is maintained for several days by further injections of from two to four cubic centimetres every twenty-four hours. The patient, although sleepy, can be roused to take nourishment and attend to Nature's calls. It is pointed out that to inject daily doses of more than five cubic centimetres of "Somnifène" is dangerous, because the sleep may verge on a condition of coma. In every case it is necessary to watch

the urinary secretion. Immediate sedative effect is obtained when the drug is injected intravenously and it has been so used with advantage in cases of general paralytic mania, *delirium tremens* and *status epilepticus*.

An Epidemic of Localized Neuraxitis.

CHARUEL and XAVIER ABELY (*Revue Neurologique*, Nos. 7-8, 1921) describe a remarkable epidemic of myelitic type of localized neuraxitis occurring in the mental hospital at Châlons-sur-Marne. There were eighteen cases and the symptoms were astonishingly uniform. Digestive disturbance and slight irritability marked an incubation period of one week. Then followed intractable vomiting and prostration, attended by a moderate degree of fever, lasting about forty-eight hours. Finally, as the most characteristic feature of the epidemic, came complete paralysis of all movements of the trunk. If the patient were raised in bed, as when feeding, and then released, he fell back heavily. His trunk was an inert mass; head and neck were often involved, while in striking contrast movements of the limbs were usually spared. Occasionally there was some dyspnoea. The tendon and cutaneous reflexes were normal or slightly weakened, excepting the abdominal reflexes, which were abolished. There was no sphincter, trophic or vaso-motor disturbance, no oculo-motor weakness and no definite somnolence. The cerebro-spinal fluid showed an excess of glucose as sole change. The paralysis above mentioned gradually passed off and in three weeks' time full recovery had taken place. The epidemic lasted from January to April, 1921; persons already weakened from other causes were specially prone to infection and they were of all ages. The authors regard the disease as a form of *encephalitis lethargica*.

Brain Tumour and Pregnancy.

JACOBI (*Psychiatrisch-Neurologische Wochenschrift*, Nos. 39-40, 1921-1922) records the following case. A previously healthy woman, in the third month of pregnancy, was suddenly taken with epileptiform seizures, which chiefly affected the right side, but were not attended by paralysis or other localizing signs. At first an irritative lesion affecting the central convolutions was suspected, later, however, the attack was put down as a phenomenon of pregnancy. In accordance with this diagnosis, it has long been known that during pregnancy spurious symptoms of organic disease, such as hyperkinesia, chorea and eclampsia, are liable to arise. In course of time *status epilepticus* developed and notwithstanding the occurrence of spontaneous abortion, continued and ended fatally. At the autopsy the surprising discovery of a tumour was made, situated not in the central region, but in the temporal lobe of the left hemisphere. It was a tumour of old standing, as shown by the presence within it of cystic degeneration. In discussing the case, it is assumed that the pregnancy alone

induced excessive cerebral irritability, in accordance with the experimental observation that the motor centres of lower animals that are pregnant show increased irritability.

A Nucho-Mydriatic Phenomenon.

EDOUARD FLATAU (*Revue Neurologique*, December, 1921), during an epidemic of cerebro-spinal meningitis, had his attention drawn to the fact that when the head of a sufferer from this disease was bent forward on the chest the pupils would dilate, returning to their original size when the head was held erect. Sometimes the dilatation would persist for from two to three minutes. The phenomenon was singularly constant and might be elicited at any time during the illness and even in chronic cases two or three months after the primary attack. A parallelism between the phenomenon and the signs of Kernig and Brudzinski is suggested. The phenomenon is also obtainable in cases of tuberculous meningitis, but as to its presence or absence in other meningitides the writer, from lack of sufficient experience, can give no opinion. There is one non-meningeal infection, however, and one only as far as he knows, in which the phenomenon is always present, namely, cervical spondylitis. In patients suffering from enteric fever, pneumonia, acute poliomyelitis, *tuberculous meningitis*, tumour of the brain and *encephalitis lethargica* the phenomenon is not manifested. The author quotes other work concerning the play of the pupils in response to external stimuli, such as pinching the skin, muscle strain and loud sounds, and discusses the cortical and sympathetic theories. He believes that the nucho-mydriatic phenomenon is due, not to excitation of the skin, but to the pain induced by movement of the cervical vertebrae.

Tumours of the Cauda Equina.

HARRY L. PARKER (*The American Journal of the Medical Sciences*, March, 1922) states that tumours of the *cauda equina*, conus and epiconus are not rare. Of thirty-three patients with tumours of the spinal cord operated on since 1916, eight had tumours in one of these areas. The duration of indications was relatively long and varied from eight years to five months. Pain in and weakness of the legs and perineal or saddle anaesthesia, with loss of control of the bladder and rectum, are characteristic indications of the condition. The pain may precede the other signs for many months and though intermittent at first it becomes constant towards the end. Movement usually relieves it and a sitting posture is the most comfortable. Sphincteric disturbance may be absent, although other signs are well established. Spinal puncture is a valuable aid in diagnosis. While diagnosis of tumour somewhere in the lower segments of the cord is comparatively simple, exact localization is often impossible or extremely hard and there may be surprising involvement of other structures, with few corresponding signs and symptoms.

British Medical Association News.

SCIENTIFIC.

A MEETING of the Victorian Branch of the British Medical Association was held in the Pathological Lecture Room of the Melbourne Hospital on June 7, 1922, the Vice-President, Dr. L. S. LATHAM, in the chair.

Pneumonia.

Dr. S. W. PATTERSON read a paper entitled "The Prognosis of Lobar Pneumonia and the Influence of Serum in Treatment" (see page 115).

Dr. W. J. PENFOLD read a paper entitled "The Action of the Pneumococcus on Aromatic Amino-Bodies" (see page 120).

Dr. R. L. FORSYTH opened the discussion and exhibited on the screen a number of thermic charts illustrative of the course taken by pneumonia in children who had received serum treatment.

Dr. Forsyth said that the general practitioner saw ten or twenty instances of pneumonia in children for every one he was called upon to treat among adults, so that there was a wide field of utility for anti-pneumococcal serum in the pneumonia of children. He would leave the discussion of the special difficulties attending the determination of the type of the infecting organism in young children to those more familiar with the laboratory aspects, but wished to remark in passing that these difficulties had hitherto constituted a great handicap in conducting the treatment of pneumonia in children on the lines of specific serum therapy.

During last winter at the Children's Hospital some twenty or thirty pneumonic children had been given serum treatment and the results observed had been compared with those obtained in the patients treated expectantly. He did not consider that the work was in any way a conclusive scientific experiment, but wished to show some of the results.

The charts exhibited were not specially selected and indeed were taken at random from among the records of those children who had been given anti-pneumococcal serum. The dose employed varied from twenty cubic centimetres to fifty cubic centimetres repeated one to four times. Type I. serum alone had been used and in their short experience at the Children's Hospital Type I. pneumococcus had occurred in 53% of pneumonic infections as compared with 33% in adults. In considering this figure, however, it was necessary to make allowance for the fact that most of the determinations of type had been carried out on empyema fluids.

From the charts exhibited Dr. Forsyth pointed out that the serum appeared to have exerted some influence, and that a satisfactory one, on the course of the disease. In almost every instance the temperature fell after the first or second injection and, taken alone, the charts might be considered a good advertisement for anti-pneumococcal serum. But on closer analysis and comparison of the records of the serum-treated children with those of the untreated series, difficulties arose at once.

The average duration of the disease in the serum-treated patients as compared with that of the untreated series was 8.3 days in the former as against 7.5 days in the latter, but the duration of pneumonia was at all times so uncertain that little could be argued from a small number of cases.

No mortality occurred among children suffering no complications and treated with anti-pneumococcal serum. A mortality comparison, however, was difficult, for the reason that children suffering from uncomplicated pneumonia invariably did well.

If *otitis media* or other septic complication were present, the serum could not be expected to benefit much; should meningitis or peritonitis supervene, the use of the serum

might be justified by their desperation, but they could not blame it for failing.

It was to be expected that the incidence of complications, especially empyema, would be diminished. In their small experience at the Children's Hospital such was not the case.

Empyema occurred in the serum-treated patients as among the untreated with unsatisfactory frequency and in about the same percentage.

Dr. Forsyth suggested that possibly the introduction of the foreign antitoxin operated to depress the natural immunity reactions and, therefore, unless the administration were repeated after the crisis, the use of serum might encourage the formation of an empyema. Needling of the lung in an endeavour to obtain material for the determination of the type of infecting organism might also initiate an empyema by infection of the pleural cavity. Whatever the reason for the failure of serum to effect a reduction in the number of empyemata the fact remained and in the American articles that he had read it was merely stated that the number of empyemata had not been increased by the use of serum in pneumonia!

A clinical type frequently met with in children was that in which the infection spread from lobe to lobe and the disease remained active until long past the tenth day, when the bases became so dull that empyema was feared and the exploring needle brought away a little serous fluid. In such instances a determination of the type of the infecting organism might be made from the fluid obtained and serum administered. He showed charts of two children in which the disease ran the course indicated and to whom serum was given with apparent benefit.

Dr. Forsyth concluded that the special difficulties surrounding the determination of the type of infecting organism in children were a bar to the wide-spread use of serum therapy and that lung puncture for this purpose should not be lightly regarded.

The expense of the serum, coupled with the trouble and pain of the injection, was too much to pay for the doubtful benefit to be gained in the ordinary acute uncomplicated case.

In the clinical type which gave indications of a protracted course, anti-pneumococcal serum promised well. In the graver meningeal or peritoneal complications a favourable result from the administration of serum was too much to expect. In empyema, repeated aspiration and injections of serum might be of use, but he would not rely on such a course from choice. He preferred to see free drainage established, though when once opened the empyema cavity soon became the seat of a mixed infection.

Dr. REGINALD WEBSTER said that the subject of the evening was one in which he had been particularly interested. He had been endeavouring to ascertain the type of organism in pneumococcal infections at the Children's Hospital and wished to acknowledge his indebtedness to both Dr. Penfold and Dr. Patterson for helpful suggestions regarding technique.

He had employed the method of mouse inoculation and agglutination of the organisms centrifuged down from the peritoneal washings, but had found in working among children that he could not identify the type of pneumococcus as certainly and consistently as appeared to be practicable in adults.

The infective material of choice—the sputum—was obtained as a rule with great difficulty from young children and frequently not at all. He had resorted to the device of holding a cotton wool swab over the glottis, thereby inducing coughing; any viscid or purulent material which might be adherent to the swab upon its withdrawal was emulsified in saline solution and injected into the peritoneal cavity of a mouse.

It seemed to him that under such circumstances an unduly high proportion of Type IV. organisms was to be anticipated; such had been the experience of A. B. Lyon, who had contributed to the *American Journal of Diseases of Children* for January, 1922, a review of the bacteriology of lobar and broncho-pneumonia in children from his studies of a series of 165 cases. This worker had also

found in three instances in which Type IV. was obtained from the sputum that one of the fixed types was present in the blood or empyema pus.

Mixed cultures in the peritoneal cavity of the mice inoculated with sputum had been a handicap when the objective was a rapid determination of type.

There was the possibility of routine blood culture, but this was not a particularly rapid, nor was it a very sure, method of recovering the pneumococcus in order to define its type.

He had carried out lung puncture in a few instances. A needle fitted to an exploring syringe was inserted into an area of consolidation, as indicated by physical signs; after withdrawal, saline solution to the amount of one cubic centimetre was drawn into the syringe, which usually contained a few drops of sanious fluid. With such saline suspension of the material aspirated from the lung, the mouse was inoculated.

The wisdom of such procedure was open to question, but so far he had not observed any bad results.

In nine lung punctures five had yielded no results. In one instance he recovered a Type I. pneumococcus, in two a non-hæmolytic streptococcus and in one a hæmolytic streptococcus.

Dr. Webster remarked that in the broncho-pneumonias of children, unless the infection were definitely known to be pneumococcus Type I., consistent results from the administration of anti-pneumococcal serum could hardly be expected. The infecting organism was just as likely to be *Bacillus influenzae*, *Streptococcus viridans* or *hæmolyticus* or *Staphylococcus aureus* as the pneumococcus.

The types which he felt he had identified most satisfactorily, were those obtained from empyema fluids. Of thirty-two organisms obtained from such sources, seventeen, or 53%, were found to be Type I. pneumococci. Pneumococci of Type II. were not represented, while those of Types III. and IV. occurred in six and five instances respectively. The remainder comprised two cultures of *Streptococcus hæmolyticus* and two of pneumococci which behaved erratically and exhibited cross agglutination with the sera for Types I. and III.

In conclusion, Dr. Webster asked, in view of the high proportion of Type I. pneumococci appearing in these empyema fluids, whether Dr. Penfold would support the inference that there was a special liability to empyema in Type I. infections.

DR. L. S. LATHAM, from the chair, expressed the indebtedness of the Branch to Dr. Penfold and Dr. Patterson.

Dr. Penfold's paper was based upon a vast amount of highly scientific work and gave them some conception of the complexity of the subject and the painstaking labour involved in the differentiation of the numerous strains of pneumococci.

He gathered from the American work on the subject that the only efficient therapeutic serum produced to date was that prepared against Type I. pneumococcus. The workers at the Rockefeller Institute, by means of their technique of mouse inoculation with the sputum of the patient, had demonstrated that the type of the infecting organism could be determined in eight to ten hours. It appeared, therefore, that if they could get the necessary bacteriological assistance and ascertain the type on the first day, it was reasonable to institute serum therapy in Type I. infections; at present there did not seem to be much benefit to be derived from the use of serum in patients in whom the infecting organism was other than Type I. pneumococcus.

He wished to ask Dr. Penfold if there were any prospect of a polyvalent serum which could be used with confidence, being made available, a serum of the efficacy and general applicability of diphtheria antitoxin. Was it likely, in view of the complexity of the problems involved, that such a serum would soon be supplied?

In conclusion, Dr. Latham referred to the direct sequelæ of serum administration. While in general these were trivial and responded to adrenalin and atropine, the occurrence of urticaria, for example, must be counted a distinct embarrassment to a patient fighting an acute disease.

MEDICO-POLITICAL.

MEETING OF THE FEDERAL COMMITTEE.

THE FEDERAL COMMITTEE OF THE BRITISH MEDICAL ASSOCIATION IN AUSTRALIA met at the B.M.A. Building, 30-34, Elizabeth Street, Sydney, on July 19 and 20, 1922. MR. G. A. SYME took the chair.

Representatives.

The following representatives were present:

New South Wales Branch: DR. R. H. TODD and DR. J. ADAM DICK, C.M.G..

Victorian Branch: MR. G. A. SYME and DR. R. H. FETHERSTON.

Queensland Branch: DR. W. N. ROBERTSON, C.B.E., and DR. J. LOCKHART GIBSON.

South Australian Branch: DR. F. S. HONE and DR. H. S. NEWLAND, C.B.E., D.S.O..

Tasmanian Branch: DR. E. BETTINGHAM-MOORE.

An apology for non-attendance was received from DR. W. W. GIBLIN, C.B..

During the first day's proceedings MR. G. A. SYME acted as proxy for DR. FETHERSTON. DR. BETTINGHAM-MOORE acted as proxy for DR. GIBLIN.

Correspondence.

A letter was received from DR. W. T. HAYWARD, C.M.G., conveying his thanks to the Federal Committee for the resolution passed at its meeting in February (see THE MEDICAL JOURNAL OF AUSTRALIA, February 25, 1922, page 225).

A letter was read from the Victorian Branch, inviting the attention of the Federal Committee to the proposal of the Federal Government to appoint a Royal Commission for the purpose of examining the working of the *Health Acts* of the several States and of the Commonwealth.

History of the Australian Army Medical Corps in the War.

THE HONORARY SECRETARY explained that the Australasian Medical Publishing Company, Limited, had continued negotiations with the Federal Government in connexion with the proposed history of the Australian Army Medical Corps in the war.

A proposal that the Committee meet General Sir Neville Howse and the Directors of the Australasian Medical Publishing Company, Limited, with a view to the discussion of the best method of procedure, was approved.

British Medical Association: Annual Representative Meeting.

Attention was called to the fact that one of the most important items on the programme of the Annual Representative Meeting to be held at Glasgow on July 21 was the proposed alterations of the Articles and By-Laws in connexion with the constitution of overseas Branches. While the several Branches were represented in the Representative Body, the Federal Committee was not so represented. It was suggested, therefore, that a greeting be sent from the Federal Committee to the Representative Body in Glasgow. It was therefore resolved that the following cable be dispatched:

"Best wishes Federal Committee successful meeting."
(Signed) "SYME, Chairman."

Australasian Medical Congress (British Medical Association).

Patrons.

It was announced that invitations had been addressed in accordance with the instructions of the Committee to their Excellencies the Governor-General of the Commonwealth, the Governor-General of the Dominion of New Zealand and the Governors of the several States of Australia and also to the Chancellor of the University of Melbourne, to accept appointment as Patrons of the First

Session of Congress. Replies accepting the invitation had been received from SIR WALTER DAVIDSON, SIR MATTHEW NATHAN, LORD JELlicoe, the EARL OF STRADBROKE, SIR FRANCIS A. NEWDEGATE and SIR JOHN HENRY MACFARLAND. In some instances the Patrons had intimated that it was doubtful whether they would be able to attend the opening ceremony in person.

Vice-Presidents.

Replies to invitations to accept the position of Vice-President had been received from the following. In all cases the invitation had been accepted. GENERAL SIR D. J. MCGAVIN, DR. T. H. A. VALANTINE, THE HONOURABLE W. F. TAYLOR, DR. A. C. PURCHAS, DR. F. ANTILL POCKLEY, DR. J. H. L. CUMPTON, GENERAL SIR NEVILLE HOWSE, PROFESSOR SIR H. B. ALLEN and SIR JOSEPH C. VERCO.

The following had been nominated by their respective Branches of the British Medical Association and had been appointed Vice-Presidents:

New South Wales: DR. T. H. FIASCHI.

Victoria: THE PRESIDENT OF THE BRANCH FOR 1923.

Queensland: DR. J. A. CAMERON.

South Australia: DR. H. SWIFT.

Western Australia: DR. D. M. MCWHAE.

Tasmania: DR. GREGORY SPROTT.

New Zealand: DR. W. MARSHALL MACDONALD.

DR. F. S. HONE expressed the opinion that provision should be made for the appointment of medical practitioners who had held prominent positions in the parent Association or in the Federal Committee, as Vice-Presidents of Congress. He instanced the positions held by Dr. W. T. Hayward. He had been a Vice-President of the British Medical Association and Chairman of the Federal Committee. Having received general support from the other members, Dr. Hone gave notice that he would move at the next meeting of the Committee as follows:

That the Regulations be altered to allow of the appointment of the Chairman and ex-Chairmen of the Federal Committee as Vice-Presidents of Congress.

Date of First Session.

THE HONORARY SECRETARY recounted the course of events which had led to the alteration of the date of the First Session of Congress from February 12 to 17, 1923, to November 12 to 17, 1923. The Chairman had determined to change the date in view of the information that had been received. The members in New Zealand had intimated that a large attendance from the Dominion could not be expected if the Congress were held in Melbourne in February. It had further been ascertained that February was regarded as an unfavourable date by members in various parts of Australia.

It was resolved that the action of the Chairman be confirmed and that the date of the First Session be fixed for the period from November 12 to November 17, 1923.

Accumulated Funds.

THE HONORARY SECRETARY AND TREASURER presented a statement of the funds held by the Federal Committee on behalf of Congress. The Honorary Treasurer of the Australasian Medical Congress, Eleventh Session, Brisbane, 1920, had forwarded the sum of £171 16s. 1d., being the balance of the funds of that Session. Some of this money had been spent by the Federal Committee in connexion with the First Session of the newly constituted Congress. It was determined that a separate account be opened.

Cooperation of the New Zealand Branch.

THE HONORARY SECRETARY reported that a letter had been received from the New Zealand Branch of the British Medical Association, in reply to a communication inquiring whether any amendments of the Constitution or Regulations were desired to meet the requirements of the medical profession in New Zealand in the event of a Session being held in New Zealand. The Honorary Secretary, Dr. Gibbes, had written to the effect that the Constitution and Regulations had the full approval of the Council of his Branch and that no alterations were desired.

Presidents of Sections.

THE CHAIRMAN reported that nominations had been received by the Executive Committee of Congress for the positions of Presidents of Sections and that the Executive Committee had appointed the Presidents of Sections. In some instances the practitioners invited had declined the positions. The invitation in these cases had been sent to other nominees. Attention had been paid to the desire to distribute the posts of honour equally among the several Branches in Australasia. The following was the list of Presidents of Sections:

Section of Medicine: DR. W. MARSHALL MACDONALD.

Section of Surgery: DR. R. GORDON CRAIG.

Section of Obstetrics and Gynecology: DR. J. A. CAMERON.

Section of Pathology and Bacteriology: PROFESSOR J. B. CLELAND.

Section of Preventive Medicine: DR. F. S. HONE.

Section of Ophthalmology: DR. D. D. PATON.

Section of Laryngology, Rhinology and Otolaryngology: DR. H. S. KIRKLAND.

Section of Neurology: DR. A. W. CAMPBELL.

Section of Orthopaedics: DR. R. B. WADE.

Section of Naval and Military Medicine and Surgery: DR. W. W. GIBLIN.

Section of Dermatology: DR. R. E. HARROLD.

Section of Radiology: DR. V. McDOWALL.

Relation of the Overseas Branches to the Parent Association.

Correspondence was read concerning the draft Articles and By-Laws to be submitted to the Annual Representative Meeting and to a special General Meeting in connexion with the power to be given to overseas Branches to become incorporated under the Companies Acts of the States, Colonies or Dominions. The Medical Secretary had acknowledged the receipt of a letter of the Federal Committee setting out in some detail the views of the Committee on the proposed new Articles and By-Laws, more particularly in regard to the correspondence of the Memorandum of Association of an incorporated Branch and the Memorandum of Association of the British Medical Association. The Council had adopted the suggestions contained in this letter and announced that amendments would be moved to give effect to this. The Council had also approved the suggestion that a model Memorandum of Association should be drafted for adoption by overseas Branches desirous of becoming incorporated. Reference to these matters will be found in the Annual Report of the Council (see *The British Medical Journal*, Supplement, May 6, 1922).

The correspondence was received.

Gold Medal.

The sub-committee, consisting of MR. G. A. SYME and DR. R. H. FETHERSTON, appointed on February 7, 1922, to obtain a design for the casting of a gold medal of the Federal Committee of the British Medical Association in Australia and estimates of the cost, reported that excellent work was done by a firm of die-casters in Melbourne. A number of sample medals was submitted for inspection. It was mentioned that the cost of the die would be from £10 to £20, according to the size and complexity of design. The gold for the medal itself would be priced according to weight. The labour of casting the medal would vary between five and ten shillings. Further information was given. It was suggested that members of the Branches be invited to forward designs for a medal. It was resolved:

That the sub-committee be instructed to submit designs appropriate for a gold medal and for other purposes.

Name Plates.

The Federal Committee at its meeting on February 9, 1922, had resolved:

That the Federal Committee is of opinion that it is not objectionable for a medical practitioner to indicate on his name plate the specialty in which he practises, provided that he confines his practice to that specialty and has the approval of the Council of his Branch.

The New South Wales Branch sought a definition of this resolution in the following circumstances: A medical practitioner conducted a general practice in a suburb and at the same time practised as a specialist in consulting rooms in the city. If he confined his city practice to that specialty, would he be permitted to indicate the specialty on his name plate? The New South Wales Branch contended that, since the practitioner was conducting a general practice in the suburbs, it was not correct to assert that he was confining his practice to the specialty. There was no suggestion that the practitioner should be prevented from carrying on simultaneously a general and a special practice, but, if he wished to do so, he should refrain from announcing the specialty on his name plate.

Replies had been received from the Victorian, Queensland and Western Australian Branches to the effect that the practitioner would be entitled to indicate on his name plate the specialty in which he was practising in his consulting rooms, even if he practised as a general practitioner in the suburbs, provided that he confined his practice in the city to the specialty indicated and provided that he had the sanction of the Council of his Branch.

The South Australian Branch had instructed its delegates to adopt the same attitude as that expressed by the Victorian Branch. It was stated that, even in those Branches adopting this attitude, opinion had not been unanimous.

After the question had been discussed, Dr. R. H. TODD moved and Dr. J. ADAM DICK seconded:

That where a practitioner carries on a general practice and at the same time has a consulting room where he carries on a special practice, he is not entitled to advertise his specialty on his name plate, in view of the fact that he does not confine his practice to that specialty.

The motion was lost by three to five.

Dr. W. N. ROBERTSON then moved and Dr. J. LOCKHART GIBSON seconded:

That a practitioner engaged in general practice, but having a separate consulting room where he practises a specialty, is entitled to have his specialty on his name plate in the terms of the resolution of the Federal Committee of February 9, 1922.

The motion was carried with two dissentients.

The Tasmanian Branch sought a pronouncement by the Federal Committee as to whether a medical practitioner who practised a specialty and announced the fact on his name plate, would be allowed to act as a consultant with another practitioner in connexion with illnesses not involved in his special branch of medical practice.

Dr. E. BETTINGHAM-MOORE explained the circumstances in which this question had arisen and amplified the proposition by giving an account of the instance which had occurred.

The Branches had considered the abstract question as propounded in a common letter addressed to them by the Federal Committee. It was held that a general pronouncement might be dangerous. It was pointed out that the rights of patients should not be interfered with in this connexion.

The following motion by Dr. R. H. TODD, seconded by Dr. J. ADAM DICK, met with general approval:

That in regard to a specialist who confines his practice to his specialty and is on that account justified in accordance with the Federal Committee's resolution of February 9, 1922, in notifying such specialty on his name plate, the occasion for him to see in consultation a patient suffering from some general illness not immediately connected with the subject of his specialty would so seldom arise that a rule prohibiting or allowing such consultation is thought to be unnecessary.

Remuneration of Ships' Surgeons.

THE HONORARY SECRETARY reported that he had submitted the views of the Federal Committee to the Australasian Steamship Owners' Federation, namely, that the remunera-

tion of ships' surgeons should be not less than £25 a month and that they should have the right to charge fees for attendance on passengers other than steerage passengers. The Federation had agreed that the rate of remuneration of ships' surgeons should be £25 a month. In regard to the fees, he has asked that the following scale should be approved, namely, seven shillings and sixpence for first-class passengers, five shillings for second-class passengers and two shillings and sixpence for third-class passengers. In reply, the Australasian Steamship Owners' Federation had offered to fix a fee of five shillings for attendance on first- and second-class passengers, others to be attended free.

After the matter had received full consideration, it was resolved that in the circumstances the proposal of the Australasian Steamship Owners' Federation be accepted.

The Control of Venereal Diseases.

Correspondence was read in reference to a resolution of the Commonwealth and States of Australia Conference on Venereal Diseases, held in February, 1922 (see THE MEDICAL JOURNAL OF AUSTRALIA, February 18, 1922, pages 196 to 198). The Conference had passed a resolution asking the Federal Committee to arrange for the issue of a circular to all members of the British Medical Association in Australia, appealing for their cooperation and emphasizing their legal responsibilities in connexion with these diseases. The Honorary Secretary had obtained from the Department of Health a summary of the duties and obligations imposed upon medical practitioners by the several *Venereal Diseases Acts*. These duties and obligations were defined as follows:

A medical practitioner was required: (i.) To notify the Commissioner of each new "case" of venereal disease upon the prescribed form. The name and address of the patient was to be omitted. (ii.) To notify the Commissioner of the name and address of any patient who failed to attend for treatment at the times or periods specified in the Act, unless he knew that the patient was under treatment by another practitioner. Allowance should be made for a period of grace, namely, ten days. (iii.) To warn the patient by written notice delivered to him of the contagious character of these diseases, of the legal consequences of infecting others and against contracting marriage until certified under the Act as cured. (iv.) To issue a certificate of cure on the form provided when the condition of the patient warranted it. In regard to the duty referred to under (ii.) it was pointed out that a patient suffering from syphilis was required to attend once in each fortnight during the primary and secondary stages and once every four weeks thereafter. Patients suffering from gonorrhoea were required to attend at least once a week during the acute stage and once in each fortnight thereafter. Attendance was required of patients with soft chancre once in every seven days until a certificate of cure was received. In regard to item (iii.) it was noted that in Victoria, South Australia, Tasmania and New South Wales medical practitioners were required to give patients such printed information relating to the diseases and to the duties of patients as were prescribed. In Western Australia medical practitioners were required to notify the Commissioner if they believed that a patient intended to marry. In connexion with the issue of certificates of cure, the Acts prescribed that no certificates of cure or of freedom from disease might be given to a prostitute or to a woman who occupied or habitually visited a brothel.

The members agreed that the cooperation of the medical profession and of the public was essential for success in combating venereal diseases.

A short discussion took place on the best means of giving effect to the wishes of the Conference. On the motion of Dr. F. S. HONE, seconded by Dr. H. S. NEWLAND, it was resolved:

That a circular letter be drafted in accordance with the request of the Conference and be sent to the several Branches, with the request that they issue a communication to their members in terms of the draft.

The New South Wales Branch had called the attention of the Committee to the claim that the objects of the Acts

could not be attained unless the provisions for prohibiting treatment by persons other than legally qualified medical practitioners were effectively administered.

Dr. R. H. FETHERSTON expressed the opinion that the Acts had been productive of good, but that further action was needed to support the measures under consideration. In Victoria "blue light depôts" were being established for the purpose of limiting the amount of infection. He moved and Dr. F. S. HONE seconded:

That the Federal Committee request the Branches in each State to communicate with the State Governments in regard to the necessity of the strict enforcement of the provisions of the Acts prohibiting treatment by persons other than legally qualified medical practitioners.

The motion was carried, as was the following:

That the Director-General of Health for the Commonwealth be informed that the Federal Committee had addressed a circular letter to the Branches of the British Medical Association in Australia and had in addition asked the Branches to urge on their respective Governments the necessity of the strict enforcement of the penal clauses in question; and that the Director-General be requested to ask the Commonwealth Government to do what it can in addition.

Reorganization of the Australian Army Medical Corps.

THE HONORARY SECRETARY reported that he had communicated the resolution of the Committee recommending the amalgamation of the Medical Services of the Navy, the Army and the Air Force to the Ministers concerned and had been advised that the matter was under consideration by the Government.

Dr. J. ADAM DICK called the attention of the Committee to the Geddes Commission Report, in which, for reasons of economy, it had been recommended that the medical services of the three arms of the defence forces be combined.

Disposal of X-Ray Plates at Military Hospitals.

Reference was made to action taken by the Federal Committee in connexion with the proposal that the old X-ray plates in the military hospitals, instead of being sold as glass, should be handed over to an approved public hospital in the capital city in each State, so that they might be used for the instruction of students and for other similar purposes. It had been discovered that the plates were not suitable for these purposes. It thus appeared that the action taken in the matter had been unnecessary.

Treatment of Discharged Soldiers.

Further correspondence was read in connexion with the scale of payment for medical services rendered on behalf of the Repatriation Department to discharged soldiers. The Minister had been urged to give effect to the recommendations of the advisory committee and to fix the scale of fees suggested by the deputation which had waited upon the Acting Minister for Repatriation on February 3, 1921 (see THE MEDICAL JOURNAL OF AUSTRALIA, February 19, 1921). The Chairman of the Repatriation Commission had considered the matter and had submitted a scale which, while not as good as that asked for, was considerably better than that contained in Circular "L." The scale was as follows:

(i.) Where the patient visits the local medical officer's surgery for treatment or examination:	s. d.
First consultation, treatment or examination	10 0
Next three consultations (treatment)	7 6
Thereafter (treatment)	5 0
(ii) Where the local medical officer visits the patient at his home or elsewhere:	
First two visits	10 0
Next four visits	7 6
Thereafter	5 0
(iii.) Mileage beyond two miles from the local medical officer's surgery (per mile during the day or night)	5 0

The term "first visit" for this purpose shall be read to mean the first time the medical officer sees the patient for a war disability. When a man seeks treatment at any subsequent date, the primary visit shall be charged at the rate laid down for the next three consultation (*viz.*, 7s. 6d. per consultation) or, if the patient is being treated at his own home or elsewhere, at the rate prescribed for the next four visits (*viz.*, 7s. 6d. per visit). Accordingly only one "first visit" fee will be paid for in the case of each man.

It was pointed out that the Federal Committee had asked for a fee of 7s. 6d. for each of the four consultations following the first and a fee of 7s. 6d. for all visits after the first. The Committee had asked for a higher mileage rate at night-time. In the last place, the definition of "first visit" or "first consultation" suggested was the first visit or consultation in each series of attendances.

Concerning the amount of money spent by the Department on these medical services, it was noted that the work was diminishing and was no longer of great moment to any one medical practitioner. The work was limited to districts outside the metropolitan areas, where discharged soldiers were treated in the Repatriation Department hospitals or by their salaried medical officers. It was thought that the amended scale might be adopted without imposing hardship on medical practitioners.

Dr. FETHERSTON moved that the terms be accepted.

The motion was seconded by Dr. ROBERTSON and was carried.

Federal Income Tax.

The Queensland Branch submitted a motion as follows:

That the amount of depreciation allowed by the Income Tax Commissioner on X-ray apparatus be increased to 25% and that X-ray tubes be classed as consumable articles.

This motion had been submitted to the several Branches and had received general support. It was pointed out that, owing to the rapid advance of radiology within recent times, an X-ray plant became unsaleable after a very few years. The Commissioner allowed $7\frac{1}{2}\%$ depreciation, whereas the useful life of these apparatus was not more than three or four years. In regard to X-ray tubes, provision already existed under the heading of replacement whereby the whole cost of all tubes that had been used up could be deducted. An X-ray tube might last a few minutes or a couple of years. It was not a matter of depreciation, but of actual replacement. It was consequently resolved:

That the Federal Committee approach the Federal Income Tax Commissioner with the request that the amount of depreciation allowed on X-ray apparatus be increased to 25%.

Notice of motion had been received from the Victorian Branch in the following terms:

That the Federal Committee be requested to inquire into the whole question of the preparation of Federal Income Tax schedules for medical men and advise the Branches in due course.

Advance copies of an article entitled "Federal Income Tax," by MESSRS. H. L. CUNNINGHAM and R. J. STIFFE, from THE MEDICAL JOURNAL OF AUSTRALIA (July 22, 1922, pages 101 to 105) were distributed to the members of the Committee. In view of the fact that the request of the Victorian Branch had been anticipated, it was determined to postpone the consideration of this matter until the members had had an opportunity of studying the article.

Maternity Allowance Act.

A motion from the South Australian Branch was presented, asking the Federal Committee to discuss the question of the maternity bonus, with a view to urging that the money be more advantageously spent. This motion had been discussed by all the Branches. The New South Wales Branch had instructed its representatives to support the suggestion. It was pointed out that Dr. Fourness Barrington had pleaded both at the Australasian Medical Congress, Brisbane, 1920, and in his address on vacating the office of President of the New South Wales Branch for extended accommodation for parturient women, for more facilities than existed for ante-natal care of pregnant women and for better training of medical and nursing

students in obstetrics. He had expressed the opinion that the money now spent on the maternity bonus would be productive of real benefit if it were used for these and analogous purposes. The Queensland Branch had also supported the motion.

Mr. SYME regretted the absence of Dr. Cumpston, the Director-General of Health. It was hoped that arrangements could be made to insure his attendance at future meetings of the Committee. The Victorian Branch supported the idea. It was held that the maternity bonus had to a large extent failed in its object. Mr. Syme further called attention to the intention of the Federal Government to appoint a Royal Commission to inquire into the working of the Federal and State *Health Acts*. This inquiry would affect the question under discussion. The health of women and the loss to the nation from a high maternal and infantile mortality were matters of importance from the point of view of the administration of the *Health Acts*.

Dr. F. S. HONE referred to the action taken by the Honourable S. M. Bruce in regard to the proposed diversion of the money misspent on the bonus to useful purposes. He had maintained that the bonus scheme had been and still was a vote-catching expedient. It was evident that the Federal Treasury was anxious to effect an economy in connexion with the £750,000 spent on the maternity bonus each year. Such an economy would have to be effected without destroying the sentimental aspect of the measure. It had been shown that the maternal mortality and morbidity were far too high. It was therefore necessary for the medical profession to lend its aid to the Government to reduce both. The proposals that should be put forward to influence both the mortality and the morbidity of women before, during and after child-birth and the mortality of infants during the first six months of life included the following: There was the establishment of a sufficient number of maternity hospitals throughout the Commonwealth to provide for the need of the parturient women. Then there was the establishment of ante-natal clinics. In the third place, child welfare centres were needed. Then more provision should be made for assistance to necessitous mothers in their homes, during the period when the mothers were in hospital and in recovery homes. It was useless to establish accommodation in maternity hospitals for everyone, if those who needed this assistance most could not afford to leave their homes. Trained women would have to be provided who would take charge of the patients' homes during their absence.

Dr. Hone held that it was a mistake to entertain a readjustment of the maternity bonus on the basis of an income limit. He hoped that the Committee would express the opinion that the money now spent on the bonus or a portion of it would be more wisely, more economically and more efficiently spent on the objects to which he had referred.

Dr. H. S. NEWLAND wished to emphasize the importance of reducing morbidity resulting from various causes in connexion with child-birth. He held very strongly that the teaching of medical students should be improved. At the present time it was evident that obstetrics were not adequately taught at the medical schools. The Federal Government should be asked to establish chairs of obstetrics at Sydney, Melbourne and Adelaide.

Dr. R. H. FETHERSTON was of opinion that better training of midwives was urgently needed. In Victoria they had a good *Midwives Act*, but the administration failed because the supply of well-trained women was inadequate. The number of untrained nurses who were allowed to practise in virtue of their experience before the passing of the measure, was gradually diminishing. He held the opinion that the bonus had done good, although he admitted that much of the money was wasted. It would, he thought, be a mistake to reduce the sum of money earmarked for the safeguarding of the health of women and their infants. Rather the amount should be increased. He advocated action being taken to induce the State Governments to amplify the efforts of the Federal Government in this respect. The State Governments could support maternity hospitals with advantage to the community.

A general discussion ensued in regard to the provision in country hospitals of accommodation for women in

labour. It was stated that, according to one estimate, there was in the metropolis of Sydney one woman attended by a registered medical practitioner to every eight attended by a midwife. This lent support to the contention that the high mortality was due to faulty management on the part of the midwives. It was further suggested that the statistical evidence of very high mortality among patients attended by medical practitioners were unreliable, in that when a midwife got into difficulties, she referred to a medical practitioner and the subsequent death would be counted against the latter.

Dr. R. H. TOMB thought that arrangements should be made for mothers to be kept for longer periods in hospital after the birth of their babies than was the case at present, especially with the view to the continuation of breast feeding. He also advocated the provision of premiums for breast feeding for a fixed number of months.

Many other aspects of the matter were discussed.

On the motion of Dr. F. S. HONE, seconded by Dr. R. H. FETHERSTON, it was resolved:

That in view of the national importance of securing a reduction in maternal mortality and morbidity and in infantile mortality the Federal Committee urges on the Commonwealth Government that the money now devoted to the maternity bonus could be more effectively expended along the following lines:

- (i.) The extension of maternity hospitals, ante-natal clinics and infant welfare centres.
- (ii.) The provision of more efficient midwifery training for nurses and medical students.
- (iii.) The provision of help for mothers and expectant mothers in necessitous circumstances.
- (iv.) Such other measures as are advised from time to time by medical experience.

A proposal to include in the recommendations a request to establish chairs of obstetrics was refused on the ground that it would be unwise at the present stage to elaborate the general principles. The Federal Committee agreed to forward the resolution to the Branches with a request that it be brought to the notice of the State Governments.

Medical Officers' Relief Fund (Federal).

A report of the Trustees of the Medical Officers' Relief Fund was presented. In a letter from the Honorary Treasurer of the Fund, it was pointed out that the total amount of the contributions was £12,048 15s. 4d.. Of this sum £15 15s. had not been collected. Some of those who had promised contributions, had since died. It was probable that the greater part of this sum would have to be written off. The Trustees asked the Federal Committee for an expression of opinion as to the policy to be followed. They asked whether it was thought that the Fund should be handled freely, using up the *corpus*, or that the policy pursued hitherto to distribute only the income from the Fund, should be continued.

The Trustees had lodged appeals against the determination of the Federal Income Tax Commissioner, who had assessed the income of the Fund at 2s. 8d. in the pound sterling. This appeal had resulted in an amended assessment for next year of 8d. in the pound. A further protest had been lodged.

After discussion it was resolved on the motion of Dr. H. S. NEWLAND, seconded by Dr. J. LOCKHART GIBSON:

That it be left to the discretion of the Trustees to administer the Fund and that, if there be any special case concerning which they are in doubt, the matter could be referred to the Federal Committee; and in any case of urgency the Trustees be authorized to use the *corpus* of the Fund.

Next Meeting of the Federal Committee.

It was resolved that the next meeting of the Federal Committee should be held in Melbourne in February, 1923. The exact date should be fixed by the Chairman.

Votes of Thanks.

A hearty vote of thanks to the Council of the New South Wales Branch was passed for their hospitality and for providing accommodation for the meeting of the Committee.

A vote of thanks to the Chairman for the manner in which he had conducted the meeting was also passed.

NOTICES.

THE COUNCIL OF THE VICTORIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION has arranged the following provisional programme of the Branch meetings. The Scientific Committee reserves to itself the right to modify the arrangements, but it is hoped that no changes will be necessary.

August 2, 1922.

At the Walter and Eliza Hall Institute of Research in Pathology and Medicine, Melbourne Hospital, at 8.15 p.m.

MR. FRED D. BIRD, C.B.: "Note on a Form of Pelvic Hydatid Cyst and its Treatment."

DR. VAL MACDONALD: "Pathological Dentition as a Pathological Entity" (illustrated by lantern slides).

September 6, 1922.

CLINICAL MEETING at St. Vincent's Hospital, Melbourne, at 8.15 p.m..

October 4, 1922.

At the Walter and Eliza Hall Institute of Research in Pathology and Medicine, Melbourne Hospital, at 8.15 p.m.

DR. H. DOUGLAS STEPHENS: "Clinical Symptoms of Enlargement of the Spleen in Children."

DR. S. O. COWEN: "Familial Splenomegaly."

DR. K. HILLER will open the discussion.

November 1, 1922.

CLINICAL MEETING at the Children's Hospital, Carlton, at 8.15 p.m..

NOMINATIONS AND ELECTIONS.

THE undermentioned has been nominated for election as a member of the New South Wales Branch of the British Medical Association:

FLYNN, JAMES ALOYSIUS FOEDUS, M.B., Ch.M., 1922 (Univ. Sydney), Sydney Hospital.

THE undermentioned have been elected members of the New South Wales Branch of the British Medical Association:

CAMERON, STEWART LLOYD, M.B., Ch.M., 1922 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

CUNNINGHAM, ARCHIBALD JAMES, M.B., Mast. Surg., 1921 (Univ. Sydney), Sydney Hospital.

FERRIS, GEORGE THOMAS, M.B., Mast. Surg., 1920 (Univ. Sydney), c.o. Dr. A. H. McIntosh, Leura.

JAMES, JOHN ALEXANDER, M.B., 1911 (Univ. Sydney), "The Manse," Wahroonga.

STAFFORD, ALBERT LESLIE, M.B., Mast. Surg., 1915 (Univ. Sydney), Berry.

AUSTRALASIAN MEDICAL PUBLISHING COMPANY, LIMITED.

ANNUAL MEETING.

THE ANNUAL GENERAL MEETING OF THE MEMBERS OF THE AUSTRALASIAN MEDICAL PUBLISHING COMPANY, LIMITED, was held at the B.M.A. Buildings, 30-34, Elizabeth Street, Sydney, on July 18, 1922, Dr. W. H. CRAGO, the Chairman of Directors, in the chair.

DIRECTORS' REPORT.

THE DIRECTORS submit their report for the past year and balance sheet as at June 30, 1922, together with the profit and loss account for the twelve months ended June 30, 1922.

THE MEDICAL JOURNAL OF AUSTRALIA, with which the business of the company is mostly concerned, completed its eighth year at June 30, 1922.

Since October 1, 1921, the type-setting and composition of the journal has been done by the company with its own equipment, the machining only being done by contract; and satisfactory arrangements have been made for a continuous supply, by direct importation from England, of good paper of uniform quality. The journal, in consequence, has been much improved in appearance.

As a business undertaking the journal is probably in a more satisfactory position now than it has been at any time in the past, for, although the cost of labour and materials has not been reduced, the price of printing paper has fallen considerably and the value of the advertising pages has increased.

From the literary and scientific point of view the journal has continued to grow in importance, while its usefulness to the profession in Australia is more and more recognized as time progresses.

The proposal that the company shall undertake the publication of a history of the Australian Army Medical Corps in the war, on behalf of and with the cooperation of the Federal Government, has been the subject of much consideration and negotiation, especially in regard to the choice of an author. This choice must, of necessity, ultimately rest with the Government rather than with the company and the difficulty of coming to a final understanding in the matter is in no small measure due to the fact that the author, whoever he may be, will have to accept the position under disadvantageous conditions for which the remuneration will not be adequate compensation.

DR. W. H. CRAGO and DR. W. KENT HUGHES retire from the Board of Directors in accordance with the requirements of the Articles of Association and are eligible and offer themselves for re-election.

For the financial position of the company you are referred to the balance sheet and profit and loss account.

W. H. CRAGO, Chairman.

July 18, 1922.

DR. W. H. CRAGO and DR. W. KENT HUGHES were re-elected Directors of the Company.

Hospitals.

THE PSYCHIATRIC CLINIC, BROUGHTON HALL, NEW SOUTH WALES.

WE have been asked to call the attention of members of the medical profession to the fact that an out-patient department will shortly be opened at the Psychiatric Clinic, Broughton Hall, New South Wales. Out-patients will be seen on Mondays and Fridays from 2 p.m. till 4 p.m..

On November 11, 1921, a clinical meeting of the New South Wales Branch of the British Medical Association was held at Broughton Hall. Owing to the large demand on our space and other circumstances over which we had no control we were unable to publish a record of this meeting.

DR. ERIC SINCLAIR, the Inspector-General of Mental Hospitals for New South Wales, gave a short account of the function and the scope of this institution.

The Psychiatric Clinic is the latest addition to the equipment of the department of the Inspector-General of Mental Hospitals. It is reserved for the treatment of patients in the early stages of mental disease or of those standing on the border-line between sanity and insanity. In addition, treatment is extended to neurasthenics and to persons known as neuropathic or psychopathic. It is hoped that the avoidance of restriction placed on patients in mental hospitals will induce many persons to seek treatment at an early stage. These persons or their relatives usually avoid the mental hospitals because of the necessity of certification under the lunacy laws. For admission to Broughton Hall the patient is required to sign a request for admission and to give an undertaking that he will submit to the rules of the institution and of the superintendent and will pay such sum for his maintenance as he

is able to afford. There are necessarily some disciplinary restrictions imposed on patients suffering from these special forms of disease, but in every other respect the institution is similar to a general hospital.

When completed, the hospital will have accommodation for one hundred and fifty patients in four wards, two for each sex. Three of these wards have already been erected and are in occupation. At present there is a temporary administration ward. The equipment of the hospital includes massage, gymnastic and other exercise rooms, a recreation room, work rooms and extensive ground for gardening and outdoor exercise.

The medical work at Broughton Hall is in charge of DR. SYDNEY EVAN JONES, to whom patients are required to apply for admission. The newly appointed Professor of Psychiatry at the University of Sydney, SIR JOHN MACPHERSON, will act as Visiting and Consulting Physician to the hospital, which will be the principal teaching institution for medical students.

Broughton Hall is situated in the proximity of the Callan Park Mental Hospital and can be reached by means of the Leichhardt tram or by the tram running between Darling Street, Balmain, and Canterbury.

Obituary.

PERCIVAL BOLLEN.

THE death of Percival Bollen, which was announced in our columns recently, removes one of its best-known and most highly respected figures from the district of Port Adelaide, where he had resided and practised for many years.

Percival Bollen was born at Mount Barker, South Australia, on November 10, 1869. At the age of thirteen he secured a scholarship which took him to Prince Alfred College. After three years, during which he passed the Junior and Senior Public Examinations at the Adelaide University, he proceeded to Canada to study medicine and graduated from Toronto University in 1891. He returned to South Australia in the same year and took up the practice in Port Adelaide that had been founded by his father. His marriage in 1892 was followed a few years later by his removal to Semaphore, where he resided until his death. He was at first associated in practice with his brother, but this partnership was dissolved in 1903. From that time he managed an extensive and ever-growing practice alone, until failing health compelled him to call in the assistance of Dr. Kennedy and later of his son, Dr. Kenneth Bollen, who had graduated at Adelaide University in 1918. Always of frail physique, it was a constant source of wonder to his colleagues how he managed to cope with the demands made on his time and strength. Of recent years, since it was discovered that he was suffering from diabetes, admiration was added to this wonder, on account of his pluck and fortitude in keeping on with work when most men would have rested. His professional work was marked by his attention to detail. Conscientiousness and kindness were the keynotes alike to his work and to his private character. It is no exaggeration to say that he was beloved by his numerous patients, whose faith in him was unusual—even in patients.

To the public he was known as an ardent supporter of the temperance movement and in later years of prohibition, on which subject he frequently spoke at public meetings. He was Medical Officer of Health for Semaphore Corporation from 1897 till its amalgamation with Port Adelaide and in 1907 he was appointed Medical Officer of Health for the City of Port Adelaide, which position he occupied until his death. In addition, for many years he occupied the position of Assistant Medical Officer to the Metropolitan County Board of Health. Percival Bollen was deeply interested in public health. His public health activities were specially marked during the local plague outbreak in 1909 and the influenza epidemic in 1919. At all times he was steadily pushing the health interests of the city, often against great difficulties, and only those behind the scenes knew the amount of time and trouble he devoted to this work.

Correspondence.

HYPOTHETICAL THERAPEUTICS.

SIR: Under the above title the reviewer of "Hormone Therapy by Sera, Vaccines and Drugs" has been rather unfortunate in expressing the principles advocated.

These may be roughly stated under the different methods of administration of sera:

(1) Hypodermically and intravenously.—The elements in the sera which are specific for toxin and organism and which are of no value when administered orally.

(2) Orally.—The hormone contents of the serum which are pathologically developed concurrently with the specific elements. These are specific for the tissues attacked, but have no action on toxin or organism. Their action is only obtained when exhibited orally or intravenously.

The same principles also apply to the use of vaccines and other proteins.

Their practical application in the treatment of disease occupies about half of the work and any one can test them for himself. And one may add that criticism of any theory must necessarily be hypothetical when it ignores the practical work on which the theory is based.

Yours, etc.,

MONTGOMERIE PATON.

156, Collins Street, Melbourne,
July 13, 1922.

DEEP X-RAY THERAPY.

SIR: Concerning Dr. Molesworth's paper in your issue of July 1, 1922, when comparing the twin induction coil and gas tube with the transformer and Coolidge tube a number of considerations worth mentioning has been omitted.

The induction coil can hardly be considered simpler when one has to deal with an interrupter, besides having to contend with the worries of inverse current. Moreover, whilst this outfit gives a most irregular discharge, so that scarcely any two successive peaks are alike, the transformer of the Snook type, such as is being used with the Victor deep therapy machine, gives an absolutely uniform output which can be maintained for hours at a time.

Another most important feature of this machine is the incorporation of the Kearsley stabilizer, so that an absolutely uniform milliamperage can be used for long periods, rendering the possibility of too great a current passing, as suggested by Dr. Edwards, quite impossible. This can only be used with a Coolidge tube, so that this device alone makes the hot cathode tube infinitely superior to any gas tube. Hence it follows that this class of outfit must be much safer to operator and patient alike than the coil machine.

With reference to voltages quoted by Dr. Molesworth until very recently those quoted have been estimated too high. Those of the Victor apparatus, being read by the aid of the standard sphere gap voltmeter, are not only uniform, but far more accurate. In fact, so accurate are the various factors that dosage may be calculated from the formula,

$$\frac{IV^2t}{d^2}$$

which is probably a more accurate procedure than the various objective methods. Of course, a correction has to be introduced for filtering from the formula

$$I = I_0 e^{-\mu d}$$

μ the co-efficient of absorption being obtained from the wave length λ thus

$$\mu = \delta (0.00658 a^3 \lambda^3 + 0.14)$$

δ being density and "a" atomic number of metal employed.

The great cost and bulk of such a transformer as the Victor deep therapy set did not prevent one worker in Chicago from purchasing it, even although he brought out a coil from Germany, which he did not even trouble to unpack. Nor has it prevented the introduction into this city of one and when one considers the hundreds of people who, through either ignorance or scepticism, fail to take advantage of the latest technique, it behoves institutions to lose no time in installing the best machine available.

It is evident that from the remarks of Drs. Furber and Bullock there does not appear to be an appreciation of the vast improvements in results, not as chance occurrences, but as a regular feature of certain class of conditions, recorded by workers and observers with the higher powered installations and it is scarcely fair to class amongst these results obtained with lesser powered apparatus. I have not yet come across a worker or observer who has not recorded considerable improvements compared with methods hitherto in vogue. The opinions of others should be ignored.

Yours, etc.,

H. FLECKER.

24, Collins Street, Melbourne,
July 3, 1922.

Medical Appointments.

DR. C. D. H. RYGADE (B.M.A.) has been appointed a Health Officer in the Department of Public Health, Queensland.

THE following appointments have been made to the Honorary Medical Staff of the Royal Alexandra Hospital for Children, Camperdown, New South Wales: DR. F. S. W. ZLOTKOWSKI (B.M.A.) as Honorary Physician; DR. LINDSAY DEY (B.M.A.) as Honorary Assistant Physician; DR. L. H. HUGHES (B.M.A.) as Honorary Relieving Medical Officer.

DR. J. C. CATARINICH (B.M.A.) has been appointed Superintendent of the Hospital for the Insane, Yarra Bend, Victoria.

DR. W. B. RYAN has been appointed Deputy Superintendent of the Hospital for the Insane, Yarra Bend, Victoria.

DR. L. J. SCOTT (B.M.A.) has been appointed Government Medical Officer at Hillston, New South Wales.

DR. J. P. O'HARA (B.M.A.) has been appointed Government Medical Officer at Barcaldine, Queensland.

DR. H. C. WHITTLE (B.M.A.) has been appointed Part-time Medical Inspector of Schools, Maryborough District, Queensland.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser," page xviii.

COMMONWEALTH PUBLIC SERVICE: Vacancy for Quarantine Officer, Fremantle.

GOVERNMENT OF TONGA: Medical Officer for Outlying Districts.

MELBOURNE HOSPITAL: Vacancies on the Honorary Staff.

ROYAL ALEXANDRA HOSPITAL FOR CHILDREN, CAMPERDOWN: Honorary Assistant Dermatologist.

VICTORIAN EYE AND EAR HOSPITAL: Vacancies on the Honorary Staff.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, 429, Strand, London, W.C.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 30 - 34, Elizabeth Street, Sydney	Australian Natives' Association Ashfield and District Friendly Societies' Dispensary Balmmain United Friendly Societies' Dispensary Friendly Societies' Lodges at Casino Leichhardt and Petersham Dispensary Manchester Unity Oddfellows' Medical Institute, Elizabeth Street, Sydney Marrickville United Friendly Societies' Dispensary North Sydney United Friendly Societies People's Prudential Benefit Society Phoenix Mutual Provident Society
VICTORIA: Honorary Secretary, Medical Society Hall, East Melbourne	All Institutes or Medical Dispensaries Australian Prudential Association Proprietary, Limited Manchester Unity Independent Order of Oddfellows Mutual National Provident Club National Provident Association
QUEENSLAND: Honorary Secretary, B. M. A. Building, Adelaide Street, Brisbane	Brisbane United Friendly Society Institute Hampton District Hospital, Kurildala, North Queensland Stannary Hills Hospital
SOUTH AUSTRALIA: Honorary Secretary, 12, North Terrace, Adelaide	Contract Practice Appointments at Renmark Contract Practice Appointments in South Australia
WESTERN AUSTRALIA: Honorary Secretary, Saint George's Terrace, Perth	All Contract Practice Appointments in Western Australia
NEW ZEALAND (WELLINGTON DIVISION): Honorary Secretary, Wellington	Friendly Society Lodges, Wellington, New Zealand

Diary for the Month.

- AUG. 2.—Victorian Branch, B.M.A.: Branch.
- AUG. 4.—Queensland Branch, B.M.A.: Branch.
- AUG. 8.—New South Wales Branch, B.M.A.: Ethics Committee.
- AUG. 9.—Western Australian Branch, B.M.A.: Council.
- AUG. 9.—Melbourne Pediatric Society.
- AUG. 10.—City Medical Association, New South Wales.
- AUG. 10.—North-Eastern Medical Association, Bangalow, New South Wales.
- AUG. 11.—New South Wales Branch, B.M.A.: Clinical Meeting.
- AUG. 11.—Queensland Branch, B.M.A.: Council.
- AUG. 11.—South Australian Branch, B.M.A.: Council.
- AUG. 15.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
- AUG. 15.—Illawarra Suburbs Medical Association, New South Wales.
- AUG. 16.—Western Australian Branch, B.M.A.: Branch.
- AUG. 17.—Victorian Branch, B.M.A.: Council.
- AUG. 22.—New South Wales Branch, B.M.A.: Medical Politics Committee; Organization and Science Committee.
- AUG. 24.—Brisbane Hospital for Sick Children: Clinical Meeting.

Editorial Notices.

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All communications should be addressed to "The Editor," THE MEDICAL JOURNAL OF AUSTRALIA, B.M.A. Building, 30-34, Elizabeth Street, Sydney. (Telephone: B. 4635.)

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